

# "This is Your Life"

JOHN ROBERTS PHILLIPS, M. D.

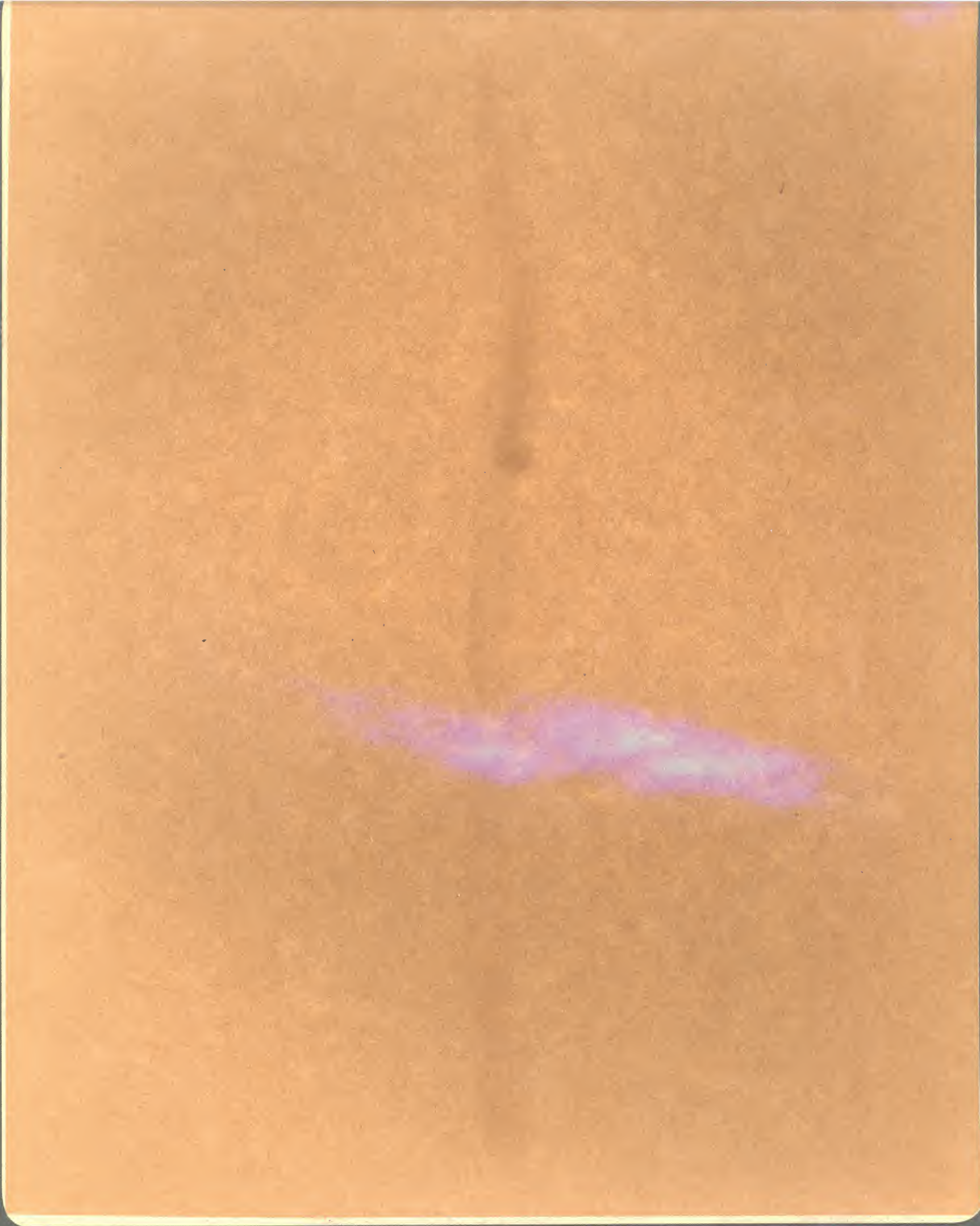
5805 Bayview Bend Houston, Texas

Volume III Medical Works

**BOOK VI**

Completed as a gift for Christmas, 1956  
By Your Anne "OLD FAITHFUL"  
REBECCA HALL PHILLIPS, R. N.





# **WHO'S IMPORTANT IN MEDICINE**

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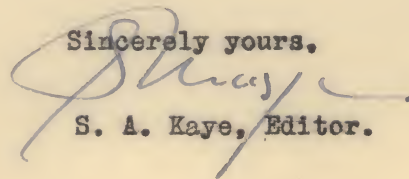
Dear Dr. Phillips:

Your biography has been prepared for printing and is now submitted to you prior to publication of the Second (1951) Edition of **WHO'S IMPORTANT IN MEDICINE**, which records the careers of outstanding Physicians, Surgeons, Medical Educators and Hospital Administrators.

Please go over this sketch carefully, making any corrections or changes you desire, and then return the proof to me with your personal signature of approval.

Should you like to own a copy of the forthcoming volume, containing your biography, a reservation card is enclosed for your convenience.

Sincerely yours,



S. A. Kaye, Editor.



August 1, 1951

Mr. S. A. Kaye, Editor  
Who's Important in Medicine  
Hicksville, N.Y.

Dear Mr. Kaye:

Enclosed is my corrected biography. Thank you  
very much.

Yours sincerely,

John Roberts Phillips, M.D.

JRP:bl



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of  
John Roberts Phillips, M.D.

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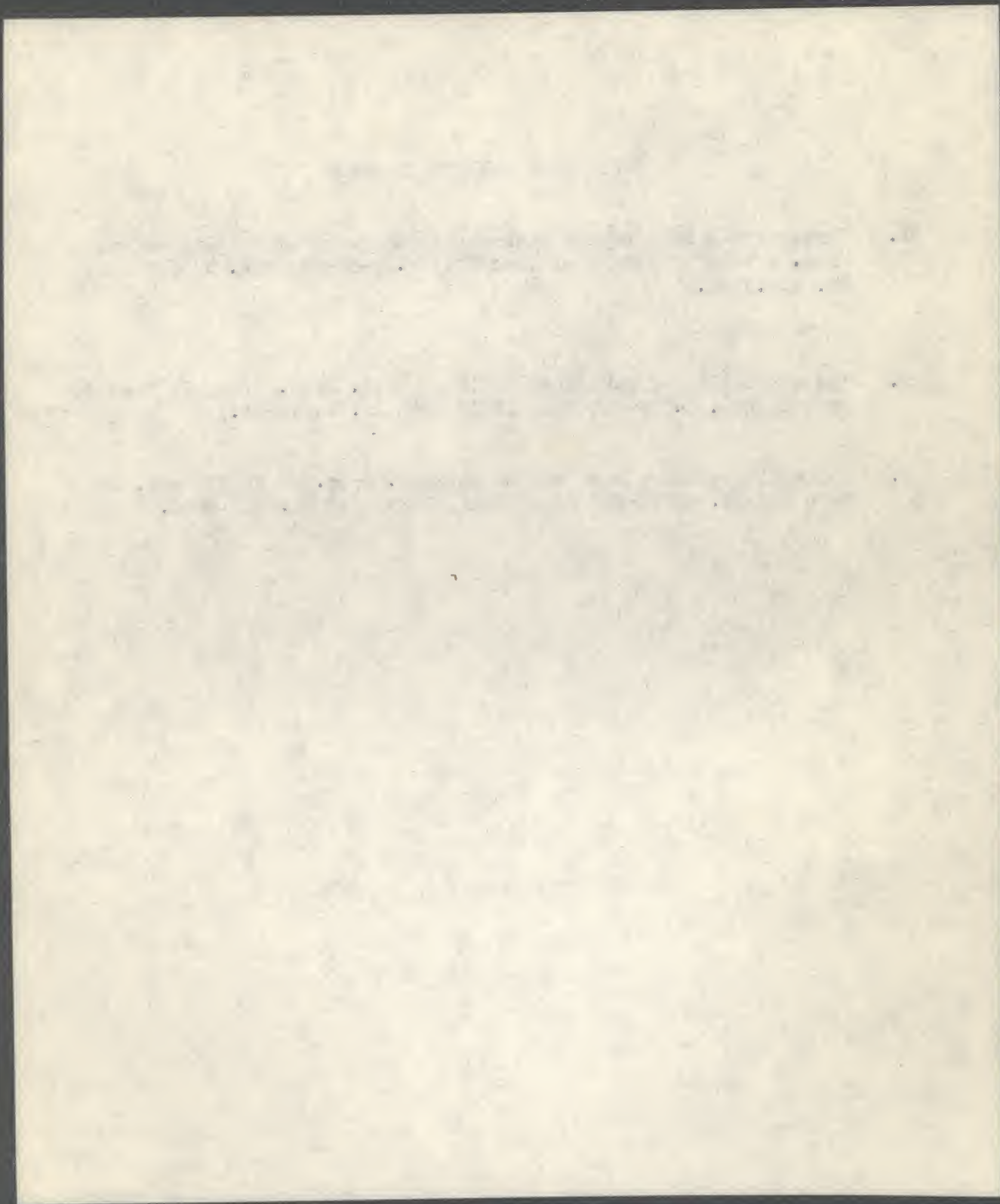
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THE TREATMENT OF DUODENAL ULCER

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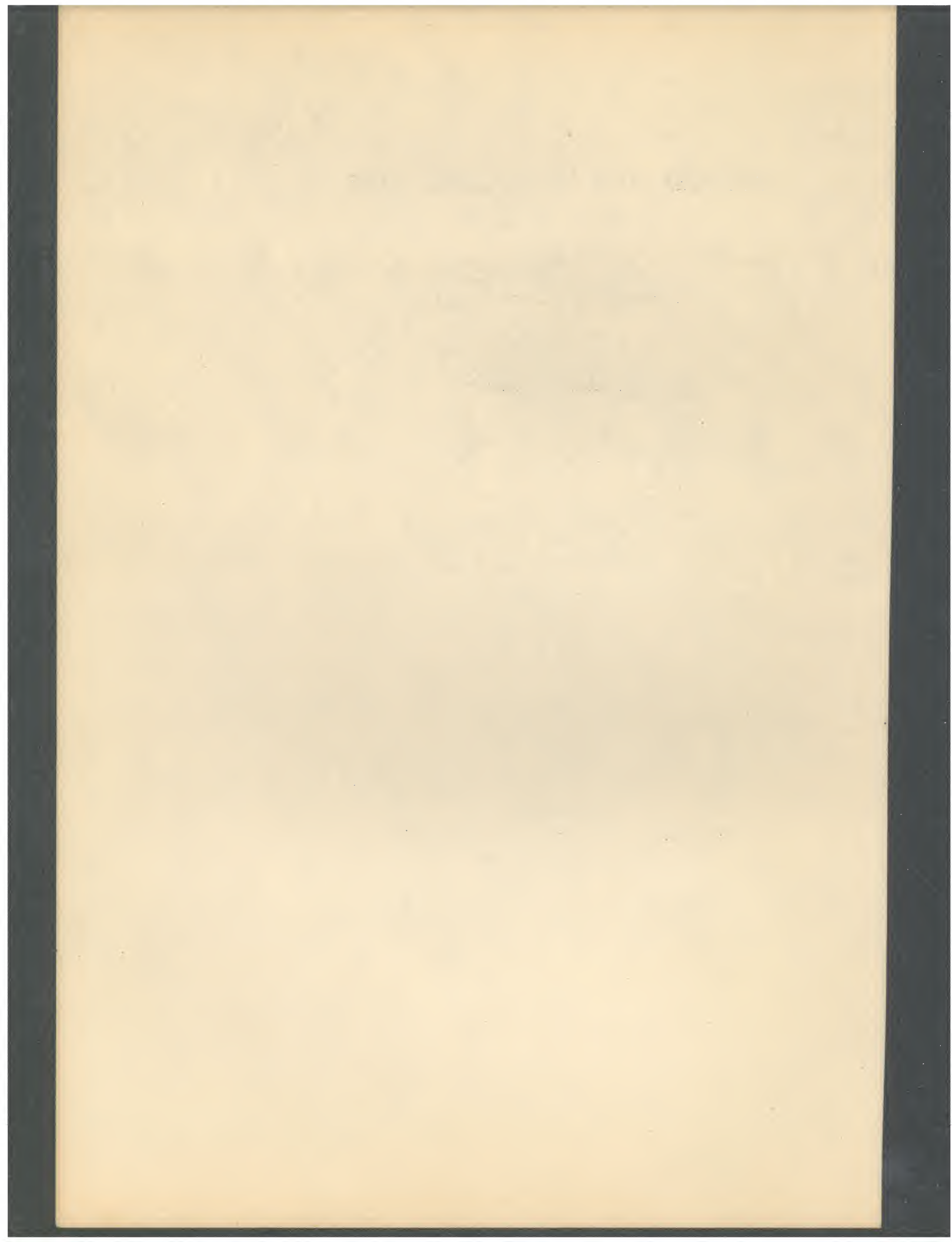
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## THE TREATMENT OF DUODENAL ULCER

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The syndrome of duodenal ulcer usually is typical. In some cases the symptoms are severe, in others they are mild or absent. It is not uncommon to find a duodenal ulcer at necropsy when death has resulted from some other cause, and so far as can be determined, digestive disturbances had never been present. Due to the mildness of the manifestations and the tendency to long periods of remission of symptoms, many patients with duodenal ulcer do not present themselves for treatment until late in the course of the disease.

The severity of the symptoms will determine the type of treatment that should be undertaken. Some patients obtain satisfactory relief for a long period by adhering to a careful medical and dietary regimen, but eventually a large proportion of them submit to surgical treatment either because they are unwilling to continue the dietary regimen to control symptoms, or because some complicating feature has developed. Since this is true, it would seem that early operation is justified in more of these cases. Delay in obtaining adequate treatment affords an opportunity for the development of

complications which constitute an additional risk at the time operation is undertaken. But we do not know just what proportion of duodenal ulcers perforate into the free abdominal cavity or the percentage that causes obstruction or gastro-intestinal bleeding, and therefore operative treatment cannot be urged on this basis alone. If the risk of surgical treatment of duodenal ulcer were not low, one would not be justified in advising operation early in the course of the disease, for it must be remembered that in some instances the procedure will be undertaken for the relief of symptoms which are more annoying than disabling. However there are certain patients, such as farmers, laboring men, traveling men, and others, who will not be able to carry on their duties while they are on medical treatment. Surgery would offer complete and permanent relief to most of these patients and add greatly to their physical and economic well-being.

Medical treatment is offered to young men and women with duodenal ulcer who are experiencing their first attacks of digestive disturbance, and to those who have the time and money to invest in a



regimen which may lead to nothing more than temporary relief. Cessation of the annoying manifestations may be obtained rather easily by medical treatment in some cases, but such experience is no assurance that the symptoms will not recur. From the onset it must be realized that this is a disease which runs a chronic course. Undoubtedly in some cases the ulcer heals spontaneously. More often, it heals slowly and poorly and even after healing it will tend to become active at intervals.

Our observations indicate that in certain types of cases the ulcer is prone to recur. Usually the patients are of nervous temperament. They find it difficult to adapt themselves to a medical and dietary regimen, and for the same reason surgical treatment may be disappointing. One should be slow to advise surgical treatment if the patient is high-strung, maintains poor living habits, or if there is a functional factor present. In such cases operation is not always satisfactory. Even extensive resection does not insure against recurrent ulceration, and if this should take place surgical approach is much more difficult at the second operation than it would have been had a local excision been made or gastro-enterostomy been performed. If the patient is obese, excision of the ulcer may be only a remote possibility. Furthermore, gastro-enterostomy may not function well, and it should not be undertaken unless some complicating factor makes surgical treatment imperative.

If such patients are hospitalized, they can be maintained on a careful regimen and under close observation, which enables a more accurate estimate of the type of treatment that will be best in the individual case. By facing the facts

promptly, it is often possible to save the patient with duodenal ulcer much time and expense.

The need for operation is determined by the presence of obstruction, evidence of perforation or hemorrhage.

Obstruction in the upper part of the gastro-intestinal tract may give rise to severe toxemia that may progress to gastric tetany, toxic nephritis, and finally cause death, if relief is not obtained. Patients with obstructive phenomena due to duodenal ulcer should have surgical treatment. Medical treatment and a supportive regimen should be carried out until they are in condition for surgical intervention. Preoperative preparatory treatment should always be given, particularly if the obstruction is marked or if the chemistry of the blood has been altered. This consists of repeated aspiration of the gastric content and the administration of fluids intravenously. If the patient is young, excision of the ulcer is preferable, in the event this can be carried out, otherwise the operation of choice for patients having obstruction due to duodenal ulcer, is gastro-enterostomy.

It has been reported that the acute ulcer perforates and that chronic lesions frequently perforate. Moynihan found that 117 deaths from perforated duodenal ulcer had occurred between 1910 and 1925 in the Leeds Infirmary. The perforating lesion was in an acute state of inflammation in eight cases only. Balfour stated that he had never observed perforation of an ulcer following gastro-enterostomy. Apparently timely surgical treatment is the best insurance against this serious complication. Uncontrollable pain, particularly that radiating to the back, is suggestive of impending or ac-



tual perforation of the lesion. If the patient is under a carefully regulated medical and dietary regimen, there is ample justification for prompt surgical intervention.

A bleeding duodenal ulcer always presents a serious problem. Although we are led to believe that death from hemorrhage is relatively rare, necropsy reports will undoubtedly reveal that a certain number of patients have lost their lives from this cause.

Hemorrhages due to duodenal ulcer vary widely in severity, frequency, and duration. Probably only a small proportion of duodenal ulcers cause bleeding, although peptic ulcer is the most common cause of hemorrhage from the upper part of the gastro-intestinal tract. Sometimes the bleeding occurs before there has been any warning suggestive of the presence of a pathologic process in the duodenum; in other instances symptoms will be absent after the hemorrhage. A frank hemorrhage may prove fatal, or several attacks of slight bleeding may not cause severe disturbance. Apparently in some cases, slow seepage persists for a considerable period.

During the first hemorrhage treatment should practically always be expectant, first because the results of bleeding are rarely fatal, second, because the operative mortality is likely to be higher than if the condition is left undisturbed, and third, because an emergency operation does not permit an accurate differential diagnosis to be made. Even if surgical intervention is undertaken during the stage of active bleeding, it is often difficult to find the point of origin of the bleeding. Whenever possible, medical treatment should be carried out for two or three weeks be-

fore any operation is undertaken. This plan will give the acute inflammatory process a chance to subside to some extent, which affords the surgeon a better opportunity to attack the ulcer directly. In some instances, transfusions of blood will be advantageous in addition to the other measures. If postoperative bleeding occurs, it usually follows indirect surgical procedures, therefore, the lesion should be removed whenever it is at all feasible. This offers the best protection against later hemorrhage.

Not infrequently multiple lesions are present. This has become more apparent since the introduction of the practice of removing the cap of the duodenum and part of the pyloric sphincter. Besides the ulcer in the usual situation on the anterior wall, there is often another lesion on the posterior wall. If it is not possible to include the ulcer of the posterior wall in the excision, it may be destroyed with the cautery or it may be sutured over. In a few cases it will not be advisable or necessary to institute any treatment for the ulcer on the posterior wall.

The symptoms of duodenal ulcer may be masked or they may be so mild that its presence is not suspected. If an ulcer is discovered during the course of operation for some other abdominal complaint, it is sometimes advisable to institute the necessary surgical procedure for the duodenal lesion before the operation is completed. If an associated chronic gastric ulcer is found, it should be removed because of the tendency to undergo malignant changes. There is some evidence to show that disease in the gallbladder or appendix may be an etiologic factor in the formation of ulcer, and perhaps this amply explains the rather frequent coincidence of these lesions. Under these cir-



cumstances, little if any benefit should be expected from a dietary regimen.

If the duodenal lesion is reactivated after gastro-enterostomy, or if the ulcer recurs after excision, the symptoms are usually identical with those of the primary lesion. If the symptoms are mild, medical treatment may be all that is necessary, but often surgical measures are required. Reactivation of the duodenal ulcer may be due to a poorly functioning gastro-enteric stoma, improper habits of living, alcohol or tobacco in excess, unremoved foci of infection, and so forth.

In event jejunal ulcer occurs following gastro-enterostomy, it is best to restore, as nearly as possible, normal gastro-intestinal continuity, by taking down the gastro-enterostomy, closing the openings in the stomach and jejunum, excising the original duodenal ulcer with the anterior two-thirds of the pyloric sphincter, and then completing the operation as a gastroduodenostomy. Should the duodenum be immobile, the risk of removing the cap of the duodenum and the primary lesion may be excessive and it is better

to leave the ulcer undisturbed after taking down the gastro-enterostomy. If the duodenal ulcer becomes active after this procedure, resection of the stomach may be indicated.

In many instances satisfactory relief is obtained by gastro-enterostomy. Elderly patients, whose ulcer has caused obstruction have obtained excellent results. However, if it is possible to excise the cap of the duodenum with the ulcer and the anterior portion of the pyloric sphincter muscle, this procedure offers some additional advantage since it relieves the patient of the lesion and eliminates the possibility of the formation of a jejunal ulcer. It is certainly the preferred operation for young patients. The procedure is applicable in about 50 per cent of all cases; in the others it will not be advisable because the duodenum is immobile or inaccessible. In almost all cases there will be a distinct advantage in having the patient adhere to a carefully regulated medical and dietary regimen for several weeks following surgical treatment.

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## PAPILLOMA OF THE GALL BLADDER\*

JOHN R. PHILLIPS, M.D.

ROCHESTER, MINN.

**B**ENIGN tumors of the gall bladder were considered rare until MacCarty described cholecystitis catarrhalis papillomatosa in 1910; he was the first in this country to describe the condition. About the time of his report, cholecystectomy began to be recognized more and more as the best procedure in treating many cases of disease of the gall bladder. With this change in surgical procedure, more thorough examination of the interior of the gall bladder could be carried out, and papillomas began to be seen more frequently by the surgical pathologist. This increasing incidence of recognition of the condition is evident in the papers of Irwin and MacCarty, C. H. Mayo, Keene, Mölle, Abell, and MacCarty.

My study was of a group of 500 gall bladders, surgically removed at The Mayo Clinic between 1923 and 1929 which proved to contain one papilloma or more. These gall bladders were taken consecutively as they appeared in the course of all operations on the gall bladder. Special attention was given to the relationship of papilloma to malignancy, and to other diseases of the gall bladder. The corresponding clinical histories were reviewed.

The incidence by age of patients was found to be as follows: ten to twenty years, 0.4 per cent; twenty to thirty years, 6.2 per cent; thirty to forty years, 29 per cent; forty to fifty years, 30.8 per cent; fifty to sixty years, 27.6 per cent, and sixty to seventy years, 6 per cent. Of the patients from whom the gall bladders were derived, 68.4 per cent were females.

From these figures the high incidence of papillomas among patients of the comparatively early age group of thirty to

forty years will be noted. Papillomas rarely occur before the third decade of life. Records of post-mortem examinations made at the clinic from 1922 to 1930 in cases in which death was from other causes than disease of the gall bladder disclose that only 3 cases of papilloma of the gall bladder were found among patients who were less than thirty years of age. These three patients were, respectively, twenty-two, twenty-four and twenty-six years of age. Mentzer, in his study of 633 consecutive postmortem examinations, found only one patient less than thirty years of age who had papillomatous cholecystitis.

All the sections studied microscopically gave evidence of inflammation, either in an acute, subacute, or chronic form, but by far the greatest number were examples of so-called chronic catarrhal cholecystitis, as is shown by infiltration of the submucosa by small round cells.

Etiologically I think two factors present themselves in the formation of papillomas: in one group infection plays the important part; in a second group, infection and metabolic disturbances work together. By far the larger number of cases will fall in the latter group.

In the cases of true inflammation, the gross appearance is that of papillary projections from the mucous membrane of the gall bladder; the color of the papilloma resembles that of the mucous membrane. The pedicle is of about the same size as the growth (Fig. 1). The growth, therefore, does not break off easily, but, as will appear, papillomas of the type next to be described do break off. Microscopically, the papillomas appear as projections with many branches, with very little stroma,

\* Abridgment of thesis submitted to the Faculty of the Graduate School of the University of Minnesota in partial fulfillment of the requirements for the degree of Master of Science in Surgery, 1932.



and give evidence of containing but little fat on staining. Many small round cells may be seen in the pedicle, often as local-

wall by a small pedicle (Fig. 3). The gall bladders are usually not badly infected, and not markedly thick walled. Microscopically



FIG. 1. Sessile papilloma, which is of same color as mucous membrane of gall bladder. Gall bladder was badly diseased.

ized collections, and in the underlying mucous membrane (Fig. 2). This type usually occurs in the thick-walled, badly infected gall bladder, the mucous membrane of which has not been destroyed. Because of the character of the projections, it would appear that if any papillomas became malignant, this type which is caused by infection alone would be the group from which the malignancy would develop.

In cases with both metabolic and inflammatory factors present, there are localized collections of cholesterol in villi, to such an extent that a papilloma is formed. The papillomas are yellowish, bulbous, easily detached, and often connected with the



FIG. 2. Papilloma with rather broad pedicle and many branching projections. There is a collection of small round cells in pedicle.

the projections are heavily laden with large, foam-like cells which represent vacuolated fat, and when specially stained, are found to contain a large amount of fat (Fig. 4). Scattered throughout the substance of these projections are a few small round cells, and at times they form into definite collections depending on the amount of infection present.

This type is associated with the strawberry gall bladder described by MacCarty, since the projections have the same gross and microscopic appearance. The difference between a papillomatous and a strawberry gall bladder is a matter of degree; in the former, the cholesterol is collected into villi to such an extent that papillomas are formed. MacCarty stated that the appearance of the strawberry gall bladder is due to a lipoid substance within the swollen



connective tissue cells which lie just beneath the epithelium. When the villi become large and branched, they form

order of frequency. Most of the cultures from chronically diseased gall bladders are sterile. Cultures from the strawberry gall



FIG. 3. Multiple papillomas attached by small pedicle, extremely friable.

papillomas. Histologically, such papillomas are identical with the villi of the strawberry gall bladder; the papillomas are merely larger and branched. If one were given a single villus of a strawberry gall bladder under a microscope, one could not state whether it was a villus of a strawberry gall bladder or a small papilloma. In some of the cases the cholesterol will be localized in one or more well-formed papillomas, without any other deposit of cholesterol appearing in the organ.

Nickel and Judd, in a bacteriologic and experimental study of 300 surgically resected gall bladders, concluded that most of the acute and subacute types contain pathogenic bacteria. The organisms are green-producing streptococci, gram-negative bacilli, and the staphylococcus in this

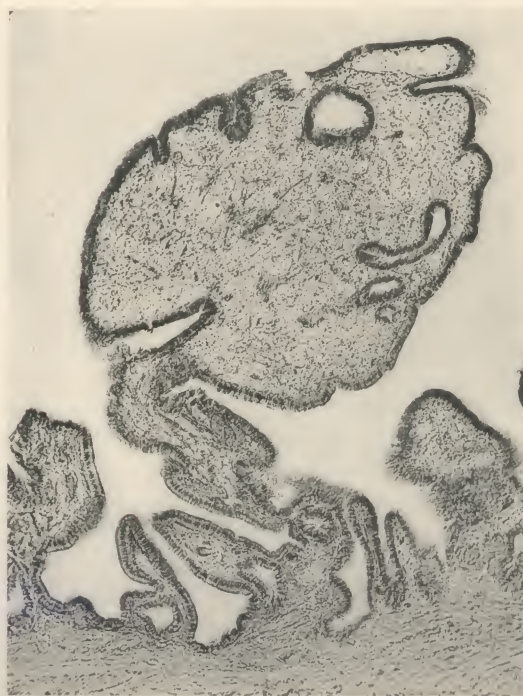


FIG. 4. Papilloma heavily laden with large vacuolated cells.

bladder also are usually sterile unless some complicating factor is present.

Often only one papilloma will be present, but larger numbers are not uncommon. In the series I studied, they were solitary in 41 per cent of cases, and multiple in 59 per cent (Fig. 3).

I found chronic catarrhal cholecystitis associated with papillomas in 255 cases (51 per cent), with strawberry gall bladder in 111 cases (22.2 per cent), and with stones in 76 cases (15.2 per cent). In 58 cases (11.6 per cent) chronic catarrhal cholecystitis was associated with strawberry gall bladder and with stones. There was, then, a total of 33.8 per cent of instances in which chronic catarrhal cholecystitis was associated with strawberry gall bladder, and in which the deposits of cholesterol were sufficient to recognize as yellowish projections; yet for all intents



and purposes the collections were localized in one or more papillomatous formations. In a high percentage of cases of chronic catarrhal cholecystitis and chronic cholecystitis with stones there is a type of papilloma like that usually seen in the strawberry type of gall bladder, but the collections are all localized to form papillomas. Of my entire group, 26.8 per cent were associated with stones.

Most of the papillomas are small. They usually vary in diameter from 1 to 5 mm. The largest papilloma noted in this series was 1.5 cm. in diameter.

Papillomas may occur in any part of the gall bladder, but they appear most frequently in the middle and cervical portions. Adenoma, a much rarer type of growth, usually occurs in the fundus. Only 9 cases of adenoma were found in my series of cases of papilloma, and all of the adenomas were in the fundus.

Duodenal ulcer was present in association with 20 of the papillomatous gall bladders (4 per cent). This figure is a little lower than that given by Eusterman, Mentzer and others for association of cholecystitis and duodenal lesions.

In reviewing the histories of the patients it was found that the usual symptoms were those either of cholecystitis, or of cholecystitis with stones.

The most important consideration is: Do papillomas of the gall bladder become malignant? This has been regarded as problematic by certain authors, although malignant degeneration has been reported by Ringel, Pels-Leusden, Siegert, and Hruška. In this series, no papilloma was found in which there was certain evidence of malignant change. In one papillomatous gall bladder there was also a carcinoma. The carcinoma may have started in a papilloma, but there was no way of proving that it had. In order conclusively to prove malignant change in a papilloma one portion of the papilloma would have to possess benign characteristics, whereas another part would have to possess malignant characteristics. In the case just

mentioned the growth that was malignant was entirely malignant, whereas the associated papillomas, in other parts of the organ, gave no evidence of malignant change.

According to Judd and Baumgartner, in the experience of The Mayo Clinic the frequency of malignancy of the gall bladder has diminished from an average of about 5 per cent in earlier years to 0.5 per cent in later years. In 1910 there were 4 carcinomas in 165 cases in which cholecystectomy was done. In 1928 there were 5 carcinomas in 1094 cases. The lower frequency in the later years is evidently due to the gall bladder being removed earlier in the disease, before malignant change takes place. Stones are almost constantly associated with carcinoma of the gall bladder; to be exact, in 94 per cent of cases of carcinoma of the organ.

Since only one carcinoma was found in the 500 gall bladders which formed the basis of this study, the incidence of carcinoma in papillomatous gall bladders would seem to be a little lower than in diseased gall bladders as a whole. This may be more apparent than real; however, carcinoma does occur almost entirely in badly diseased gall bladders which contain stones, whereas papillomatous gall bladders represent a process resulting from less infection and with less injury to the mucosa. That the mucosa of papillomatous gall bladders is not injured is brought out by the work of Caylor and Bollman who found, in a study of the bilirubin content of bile from the gall bladder in cholecystic disease, that gall bladders which contained papillomas and the associated hypertrophic rugae concentrated bile more than any others in their series of 105 cases, which included all kinds of disease of the gall bladder. Papillomatous gall bladders appear to possess the greatest amount of absorbing surface because of the epithelial covering of the papilloma and the hypertrophic rugae. Caylor and Bollman concluded that the concentrating activity is absent in acute inflammatory disease of



the gall bladder, empyema, hydrops, and contracted gall bladders, whereas in cases of cholecystitis with associated papillomas and hypertrophic rugae, the concentration of bile is definitely increased. Between these two extremes wide variation in the content of bilirubin is found.

Kirklin also noted roentgenologically that the shadows of papillomatous gall bladders were of excellent density, and frequently were better than the average. This is in accord with the work of Caylor and Bollman. Kirklin was the first to diagnose papillomas roentgenologically, and this is usually the only method of diagnosing them before the organ is submitted for pathologic examination. Very rarely, papillomas may be seen shining through a thin-walled gall bladder when the abdomen is opened.

As infection progresses in a gall bladder, the walls become more and more thickened, the mucous membrane becomes ulcerated or destroyed, gallstones are formed, and it is reasonable to believe that the papillomas are destroyed along with the mucous membrane. Therefore, on opening thick-walled, badly diseased gall bladders, one does not expect to see papillomas as often as in gall bladders which give evidence of only moderate disease. In this series, 15.6 per cent of the gall bladders were the site of cholecystitis graded 1. Many cases of cholecystitis graded 1 will be missed surgically and consequently papillomas will be missed also. However, Judd and Wilkie both have expressed the belief that if a good history of disease of the gall bladder is given, and colic has occurred, even if the gall bladder does appear fairly normal at operation, it should be removed, because the percentage of cures will be high.

Papillomas also probably play a part in formation of stones, for each papilloma is a polypoid projection of mucous membrane and stroma, and is heavily laden with cholesterol esters. I have frequently seen them broken off and lying loose in the gall bladder and have also seen them break

off on the slightest touch. Boyd, Stewart, and Mentzer expressed the belief that papillomas form nuclei for formation of stones, since they are polypi laden with cholesterol, and furnish ideal nuclei for precipitation of constituents of bile. Gosset, Bertrand, and Loewy also expressed the belief that they may break off and form nuclei for formation of stones, or that the cholesterol esters may be extruded following ulceration of the papillomas or the adjoining mucous membrane of a strawberry gall bladder, and in that way form nuclei. They found particles of small stones free in the bile in twenty of their 38 cases.

Although papillomas are fairly common now, I am sure that they may be frequently overlooked by the pathologist because of their small size, their friability, and their color; a small layer of bile may completely obscure them.

#### CONCLUSIONS

1. Pathologically, papillomas are of interest because of the place they occupy in relation to disease of the gall bladder.
2. From a clinical standpoint, treatment will have to depend on symptoms, for papillomas usually will not be recognized until the gall bladder is opened in the laboratory.
3. Malignancy was seen in only one of my group of 500 papillomatous gall bladders, and even in that instance, not etiologically associated with papilloma. It would not appear that malignancy would occur any more frequently in papillomas than in adjoining villi, since papillomas are only hyperplastic villi laden with cholesterol.
4. Papillomas occur, for the most part, in early disease of the gall bladder.
5. Papillomas may play a part in formation of gallstones, since when broken off from the mucous membrane they form a good nucleus for precipitation of constituents of bile.



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19

## RUPTURED OVARIAN CYST

JAMES C. MASSON AND JOHN R. PHILLIPS

Ruptured ovarian cysts associated with intraperitoneal hemorrhage are rare. Prior to 1900 the literature is not clear as to whether the bleeding in such cases was secondary to ruptured extra-uterine pregnancy or to ruptured ovarian cyst. In 1924 Phanem thoroughly reviewed the literature and found fifty-nine cases, twenty of follicular cyst, twenty-two of corpus luteum cyst, and seventeen of hematic cysts, type not stated. Since then several other cases have been reported. We have recently observed a case, the history of which is given below.

A woman, aged thirty-four years, came to the clinic November 18, 1931, because of cramping abdominal pains which had begun suddenly ten hours before. The pains were chiefly in the upper part of the abdomen; they were intermittent, lasted one to two minutes, and occurred about every half hour. She was very weak and had fainted several times before her admission. She had been a patient at the clinic two and a half and two years before; the last time there was some suggestion of gastric ulcer but achlorhydria was present and roentgenograms of the stomach were negative. Moderate secondary anemia was also present.

The entire abdomen was tender. Rigidity was noted in the right upper quadrant of the abdomen. The patient was pale, with the appearance of shock. Leukocytes numbered 23,750 and erythrocytes 4,510,000 in each cubic millimeter of blood. The concentration of hemoglobin was 52 per cent, and the blood pressure in millimeters of mercury was 95 systolic and 55 diastolic. The pulse rate was 120 beats each minute. The clinical diagnosis was perforating ulcer, disease of the gallbladder or acute pancreatitis. There had been no abnormal bleeding, menstruation had been a little irregular but there was nothing suggestive of extra-uterine pregnancy. The patient was therefore treated expectantly. However, during the next five hours her condition did not improve, the cramp-like pains became worse, the right lower quadrant of the abdomen became tender and the appearance of shock increased. At this time ruptured extra-uterine pregnancy was suspected and an operation was performed.

The abdomen was opened through a low median line incision. The pelvic cavity was filled with blood clot, and the general abdominal cavity was filled



with a blood-stained fluid. Resection of the ovary was done and the wall of the cyst was removed, the hemorrhage being controlled by suture. The uterus was retroverted but it was not disturbed because of the patient's critical condition. No further exploration was done. The patient was given 500 c.c. of citrated blood while on the operating table. Convalescence was uneventful and she was dismissed on the fourteenth day after operation.

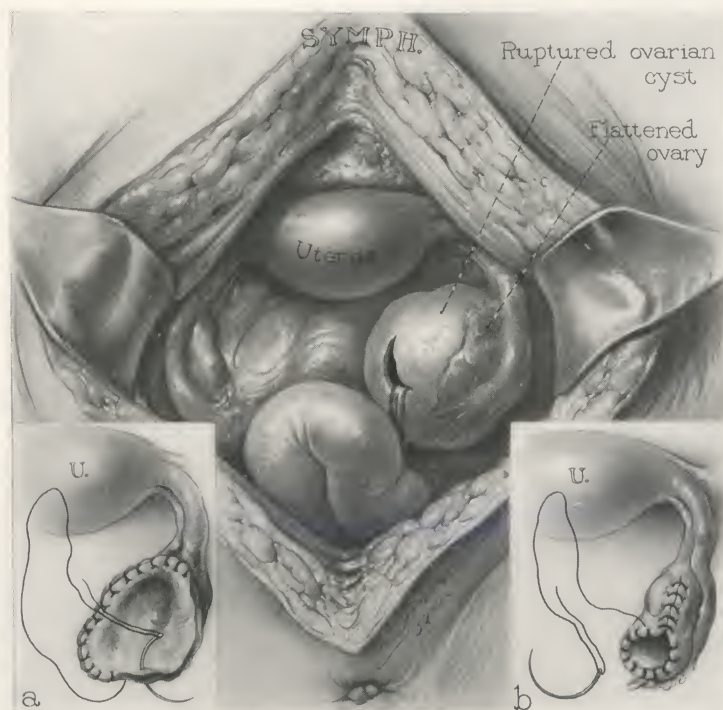


Fig. 266.—The tear in wall of cyst with blood clot protruding. *a*, Method of suture of the ovary after resection of wall of the cyst to control bleeding, and *b*, restoration of ovary to normal shape, which also insures against further hemorrhage.

The pathologist reported hemorrhagic ruptured corpus luteum cyst with a large amount of clotted blood (Figs. 266, 267).

This case induced us to go over the clinic records for the last ten years. Eleven cases were found in which a ruptured ovarian cyst was responsible for the intraperitoneal bleeding. Most of the patients were in the younger age group, from twenty-two to

thirty-five years; one patient was sixty-two years. The very large blood clot in this case, about 15 cm. in diameter, was from a ruptured hemorrhagic adenocarcinomatous cyst. Menstrual periods were usually fairly regular in these cases and of no unusual consequence in the diagnosis. The number of days of rupture after menstruation did not seem to be a constant fac-

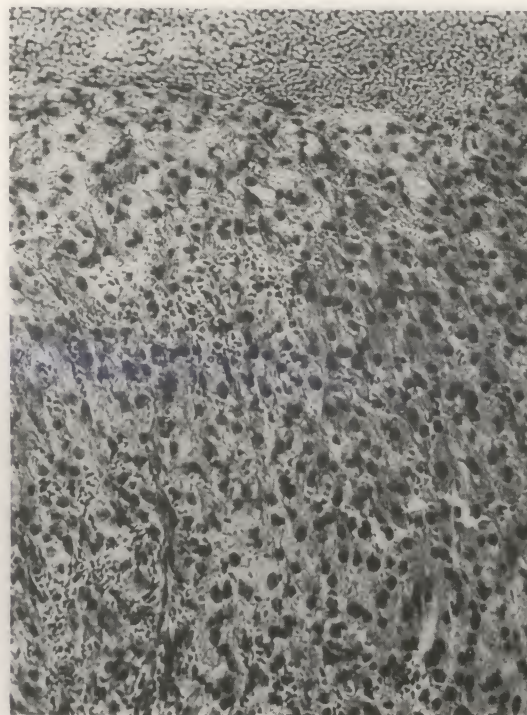


Fig. 267.—The full thickness of the wall of the cyst with luteum cells.

tor although the average was fourteen to nineteen days; the shortest was of six days and the longest of twenty-eight. The symptoms were pain in the lower part of the abdomen, tenderness, rigidity, nausea, elevation of pulse and leukocytosis, thus leading to the diagnosis of acute appendicitis in nine cases. In one case the diagnosis of intraperitoneal hemorrhage from possible ovarian cyst was made, and in one of ruptured ectopic



pregnancy. Emergency operations were done in eight cases; in the other three the symptoms were mild and at operation only a small amount of blood was found. The duration of symptoms before operation was usually less than twelve hours. In all but two cases the right ovary was involved, thus explaining the ease of confusion with appendicitis. The amount of blood in the peritoneal cavity varied from that referred to as a small amount in three cases to that estimated as more than 1 liter in three cases; in two of the latter transfusion was necessary. The operations were either removal of the ovary or resection of part of it with suture of the edge to control bleeding.

The pathologist reported ruptured corpus luteum cyst in two cases, hemorrhagic cyst in five cases, simple ovarian cyst in one case, and ruptured hemorrhagic cystadenoma in one case. In two cases a specimen was not removed, the bleeding being controlled by suture. The postoperative course was uneventful in all, but in one case phlebitis developed which kept the patient in hospital forty days.

The diagnosis is rarely made before the abdomen is opened. In the cases in which the bleeding is slight it cannot be recognized before operation. Occasionally if there is evidence of intra-abdominal bleeding in the absence of change in the menstrual cycle, a ruptured cyst might be suspected. The acuteness of the pain without definite localization often leads to the diagnosis of a ruptured viscus, acute appendicitis or acute cholecystitis. The important factor is to recognize the existence of a surgical emergency.

ACUTE INTUSSUSCEPTION IN CHILDREN: REPORT OF  
THIRTY-ONE CASES; TUBERCULOUS CYST OF A FAL-  
LOPIAN TUBE; FEMORAL PERITONEAL CYST: REPORT  
OF A CASE

CHARLES W. MAYO AND JOHN R. PHILLIPS

ACUTE INTUSSUSCEPTION IN CHILDREN: REPORT OF THIRTY-  
ONE CASES

Acute intussusception, in the main, affects children who have been healthy previously. In approximately 80 per cent of cases the condition occurs among children aged less than two years. Early recognition and early surgical intervention afforded such satisfactory results that it seemed worth while to study the records of these cases in which treatment had been carried out at The Mayo Clinic.

Thirty-one cases of acute intussusception of children up to the age of twelve years were studied. Twenty-one of the children were boys and ten were girls. In 65 per cent of the cases the condition occurred in the first year of life. The youngest patient was aged less than three weeks. In the literature, however, the condition has been reported as occurring as early as two days after birth. In our series six cases occurred up to the age of six months; fourteen at from six to twelve months; five at from twelve to eighteen months, and in six the children were aged more than two years.

The symptoms were typical; sudden onset in a previously healthy child of abdominal pain, distention, vomiting, and the passage of blood and mucus in the stools, with a tumor usually in the right quadrant. The diagnosis should be made the first time the patient is seen because it is the delay beyond twenty-four hours, or until the second or third time the physician visits the patient, that causes the high mortality. An incompletely taken history and incomplete examination with a casual diag-



nosis of colitis, summer diarrhea, or convulsions, may bring a moribund patient to the surgeon.

In all of the cases in this series the intussusception occurred at the cecum. In one case the intussusception was double; one at the cecum, and one in the sigmoid. Recurrence did not occur although in two instances it was necessary to reoperate for the release of obstruction due to adhesions.

Sixteen of the thirty-one patients were operated on within the first twenty-four hours without a death. In these sixteen cases it was possible to reduce the intussusception with comparative ease. Beyond twenty-four hours reduction is done with difficulty, and gangrene of the intussuscepted bowel may further complicate the condition. It is this group of cases in which improvement in surgical judgment can do much to lower mortality.

There were seven deaths in the thirty-one cases, a mortality of 22.5 per cent. Many factors influence mortality and we felt it advisable to analyze the cases in which the patients died (tabulation).

We have shown that in cases of less than twenty-four hours' duration, reduction of the intussuscepted bowel and fixation of the part to the mesentery of the cecum, the side of the ascending colon or the peritoneum is a fairly simple, efficient procedure, and that it carries a low mortality. This observation is also recorded in the literature.

Nature's effort at repair is to arrest the intussusception, and her success is, of course, variable. After twenty-four hours, however, reduction becomes more difficult and more hazardous as is indicated by the duration of manipulation and the increasing mortality due to shock, or peritonitis as a result of tears in a friable and poorly nourished section of intestine.

The crux of the situation lies in the interpretation by the surgeon of justifiable effort at reduction. It is impossible to put down in writing just how hard or how long one should attempt to reduce intussusception. We have learned, however, in operating on the colon, particularly in the presence of an obstructing growth, that manipulation is done with definitely in-

creased risk. This is true in the presence of intussusception. If reduction has been difficult, and on examination the intussuscepted bowel is found to be gangrenous, another serious

## TABULATION

## MORTALITY

Age, months.	Duration of symptoms, hours.	Comment.
Twenty-four to forty-eight hours.		
7	30	Intussusception of 12 inches of ileum and 8 inches of cecum reduced; death two hours postoperatively.
12	31	Ileocecal intussusception around to transverse colon; appendix black; reduced and sutured ileum to mesentery of colon; appendectomy; death sixth day after operation of peritonitis.
0.75	36	Ileocecal intussusception 6 inches long; turbid fluid in abdomen; bowel gangrenous; reduction impossible and side-to-side ileocolostomy with resection was done; death day after operation of peritonitis and shock.
7	40	Ileocolic intussusception around to descending colon; reduction; black necrotic ileum; resection of 5 cm. of small bowel; end-to-end anastomosis, and side-to-side ileocolostomy; death from shock day after operation.
Forty-eight to seventy-two hours.		
10	54	Ileocolic intussusception; ileum, cecum, appendix, transverse colon into descending colon and sigmoid; reduction; tear in transverse colon which was closed; ileum sutured to mesentery of cecum; death first day of shock and ileus.
9.5	72	Possibly acute on chronic basis; double, one ileocecal and other in sigmoid (3 inches); reduced; hole in cecum due to necrosis; catheter placed in cecum; death same day of shock.
11	72	Ileocolic intussusception around to descending colon; about 9 inches of ileum; reduced; possibility of perforation; death four days later; multiple ulcers of ileum and bronchopneumonia found at necropsy.

problem confronts the surgeon; he must decide between resection and extraperitonization of the affected bowel.

When resection is performed the average mortality is probably between 90 and 95 per cent. In two cases in this series resection was done and both patients died. Hipsley has noted



100 per cent mortality following resection for acute intussusception; Clubbe has noted 88 per cent, Close, 100 per cent, and Peterson and Carter, 76 per cent. Wangensteen in considering acute intestinal obstruction stated that in the average case in which a few feet of nonviable intestine must be excised, exteriorization and secondary anastomosis at an opportune time carries less risk to the patient. It is certainly true that multiple operations in stages are more easily tolerated than one extensive operation.

Although we do not wish to state positively that reduction should not be done after so many hours of symptoms, we nevertheless believe that in preference to difficult reduction the surgeon should consider more seriously further fixation of the intussusception to prevent progression, and short circuiting of the involved portion by means of ileocolostomy. As yet no large series of cases has been reported, but in cases in which this method has been used it has met with marked success. The method has been supported by the work of Montgomery and Mussil on dogs. Such a measure takes additional advantage of the possibility of spontaneous elimination of the intussuscepted bowel.

Spontaneous anastomosis and elimination of the affected bowel was, of course, much more common before the era of surgery. Recently, one of us (Mayo) reported a case of intussusception in which, because of the precarious condition of the patient, the only operative procedure was ileostomy for the relief of obstruction. Several days afterward between  $3\frac{1}{2}$  and 4 feet of necrosed bowel passed out of the rectum. Recovery followed with from one to two bowel movements a day by rectum. Later the ileostomy was closed, entero-anastomosis being done just back of the closure. We have seen the patient from time to time since and his progress has been quite satisfactory.

**Summary.**—Thirty-one cases of acute intussusception with a mortality of 22.5 per cent are reported. In sixteen cases operation was performed within twenty-four hours without a death.

Reduction and fixation of the intussuscepted bowel to pre-

vent recurrence is an efficient and satisfactory procedure in early cases. After twenty-four hours reduction should be done with less frequency, preference being given to a type of operation to fix the intussuscepted bowel to prevent progression and a short circuiting procedure.

Resection should be done very rarely; it carries a mortality in these cases of between 90 to 95 per cent. Extraperitonization of the affected loop should be done in preference to resection.

#### TUBERCULOUS CYST OF A FALLOPIAN TUBE

About 7 per cent of all fallopian tubes in which there is pathologic change are tuberculous. Primary lesions are uncommon, although they may occur. The usual primary focus is in the lungs or in some bone or joint. Ascending infections are also rare; Cohnheim thought that the usual method of infection was by ascent.

The fallopian tubes are usually the first of the genital organs to be infected. The uterus is involved, by direct extension in about half of the cases. The infection may also spread to the peritoneum, giving rise to tuberculous peritonitis. Infection from the peritoneum may also be picked up by the tube, due to its ciliary action, much as an ovum is picked up.

Tuberculosis of the ovary itself occurs in only about 5 per cent of cases of tuberculosis of the fallopian tubes, but peri-oophoritis is not infrequent. Tuberculosis of the fallopian tube bears about the same relationship to tuberculosis of the ovary that tuberculous epididymitis bears to tuberculosis of the testis.

There are no pathognomonic symptoms of tuberculosis of the fallopian tubes and the diagnosis usually is not made until the specimen is submitted for pathologic examination, and then, often it can be made only by use of the microscope. Sterility occurs in about 75 per cent of cases.

Although the condition is usually bilateral, if the patient is a young woman desirous of bearing children, as conservative a procedure as possible should be done. We wish to report a case



in which only one tube was involved in a cystic process, whereas the other tube, from all gross appearances, was normal.

A woman, aged twenty-eight years, entered the clinic May 26, 1932, complaining of rectal pain and of sterility. There was no family history of tuber-

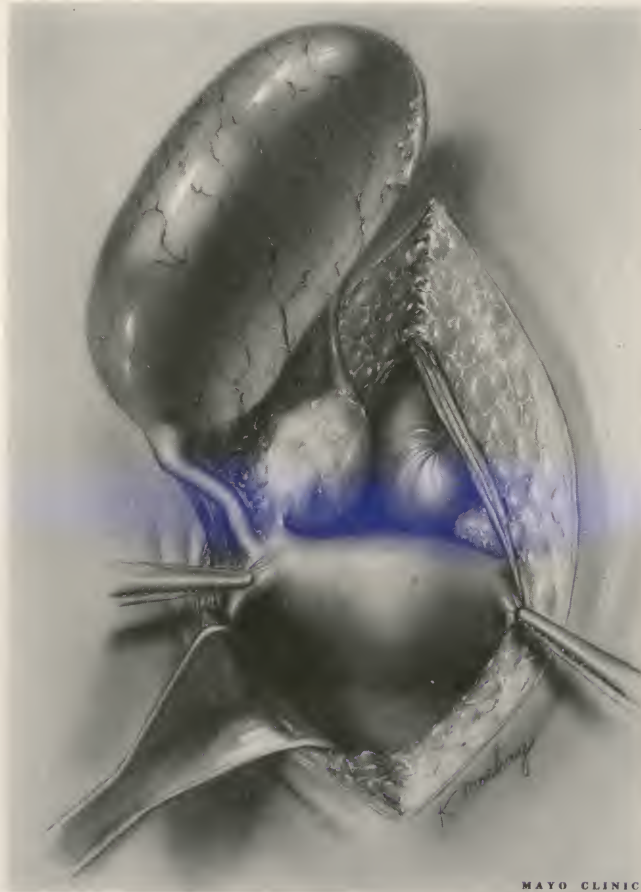


Fig. 306.—Cyst of fallopian tube. The condition is entirely localized with evidence of peritoneal adhesions.

culosis and her past history was negative. Her menses had begun when she was aged twelve years and had always been regular, but there was some pain, and the flow was considered scanty. She had been constipated more or less all her life, and in the year before her admission to the clinic she had had pain and had

passed some bright red blood with bowel movements. In the last few years she has had several attacks of pain in the right lower abdominal quadrant associated with soreness. She had been married four years and had not become pregnant. She desired to have children, and her sterility was one of her chief reasons for coming to the clinic.

The patient was well developed and well nourished; her temperature was 99.2° F. at 3 p. m. Examination of the thorax including a roentgenogram, gave negative results. Pelvic examination revealed a mass in the posterior culdesac, 6 cm. in diameter, not freely movable. The urine and blood were negative to

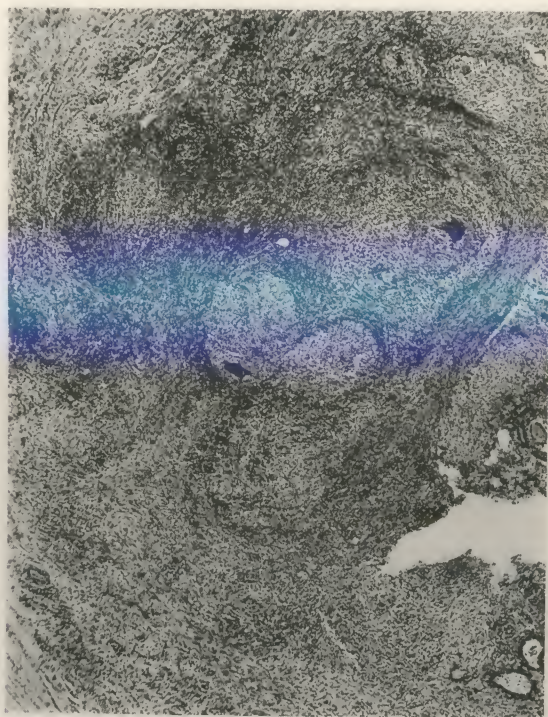


Fig. 307.—Wall of the cyst. Numerous tubercles are present.

the usual examinations, and the Wassermann reaction of the blood was negative. Roentgenograms of the kidneys, ureters and bladder were negative. A proctoscopic examination disclosed internal hemorrhoids graded 1 and an anterior anal fissure. The clinical diagnosis was recurrent appendicitis and pelvic tumor.

May 30, 1932, under general anesthesia, through an incision low in the median line, a chronically inflamed appendix was removed, and exploration of the culdesac revealed a freely movable mass, about 11 cm. long, with a diameter of about 5 cm. which involved the distal two-thirds of the right fallopian tube, and which had the appearance of Camembert cheese. The right ovary, as well as



the left fallopian tube and ovary were grossly normal. The uterus was normal in size, and was in good position. Right salpingectomy was performed, cutting a wedge-shaped piece from the horn of the uterus.

The report after examination by the pathologist was of tuberculosis of the right fallopian tube, with a caseated cyst of the distal half (Figs. 306, 307), and chronic catarrhal appendicitis.

Since there was no other evidence of tuberculosis in the body, as far as could be determined, it is possible that in this case only one tube was involved. The reason for performing salpingectomy on only one side has been given.

#### FEMORAL PERITONEAL CYST: REPORT OF A CASE

A woman, aged forty-two years, presented herself at The Mayo Clinic March 23, 1932, for operative care of a condition which was clinically believed to

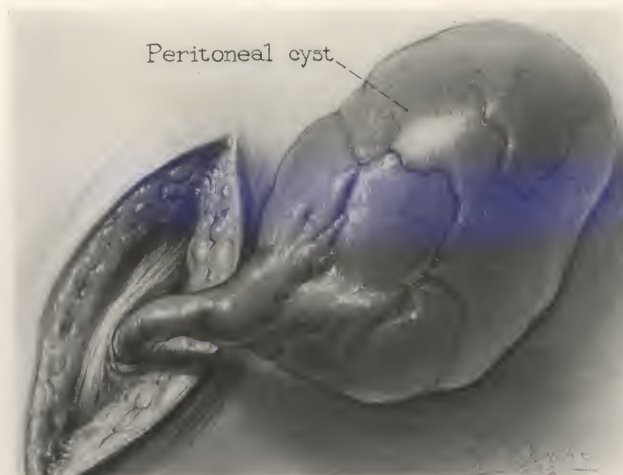


Fig. 308.—Peritoneal cyst in femoral hernia.

be a femoral hernia. In a sense the diagnosis was correct, but at the time of our examination pathologic changes had occurred so as greatly to alter the condition. Evidently what happened in this case was that a femoral hernia actually started, and after a nubbin of peritoneum had pushed through the femoral ring, the neck of the sac constricted and secretion began to fill it slowly. Whether the sac contained bowel at any time is questionable; none was found at operation. The mass in the left groin, about 8 cm. in diameter had appeared six years before the patient's admission, but was reducible until four years before, when it became

irreducible. For the last six months it has been increasing in size and caused pain and tenderness. A diagnosis was made of left incarcerated femoral hernia.

A left horizontal femoral incision was made and a maroon-colored mass (Fig. 308) containing dark fluid was found. The neck of the cyst, which came out of the femoral ring, was exposed. The sac appeared to be lined with peritoneum. A curved hemostat was inserted into the peritoneal cavity with

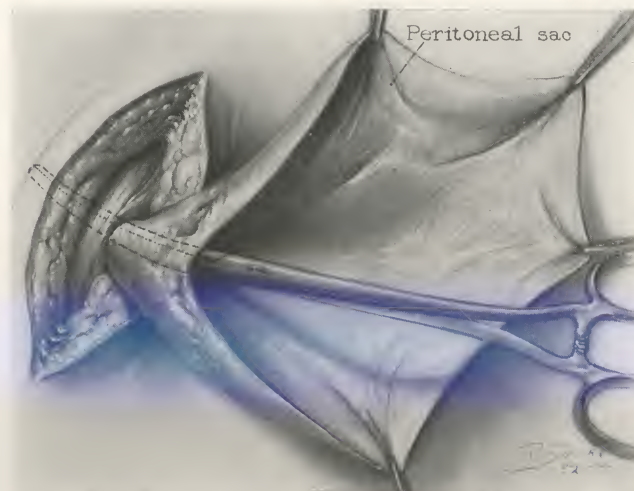
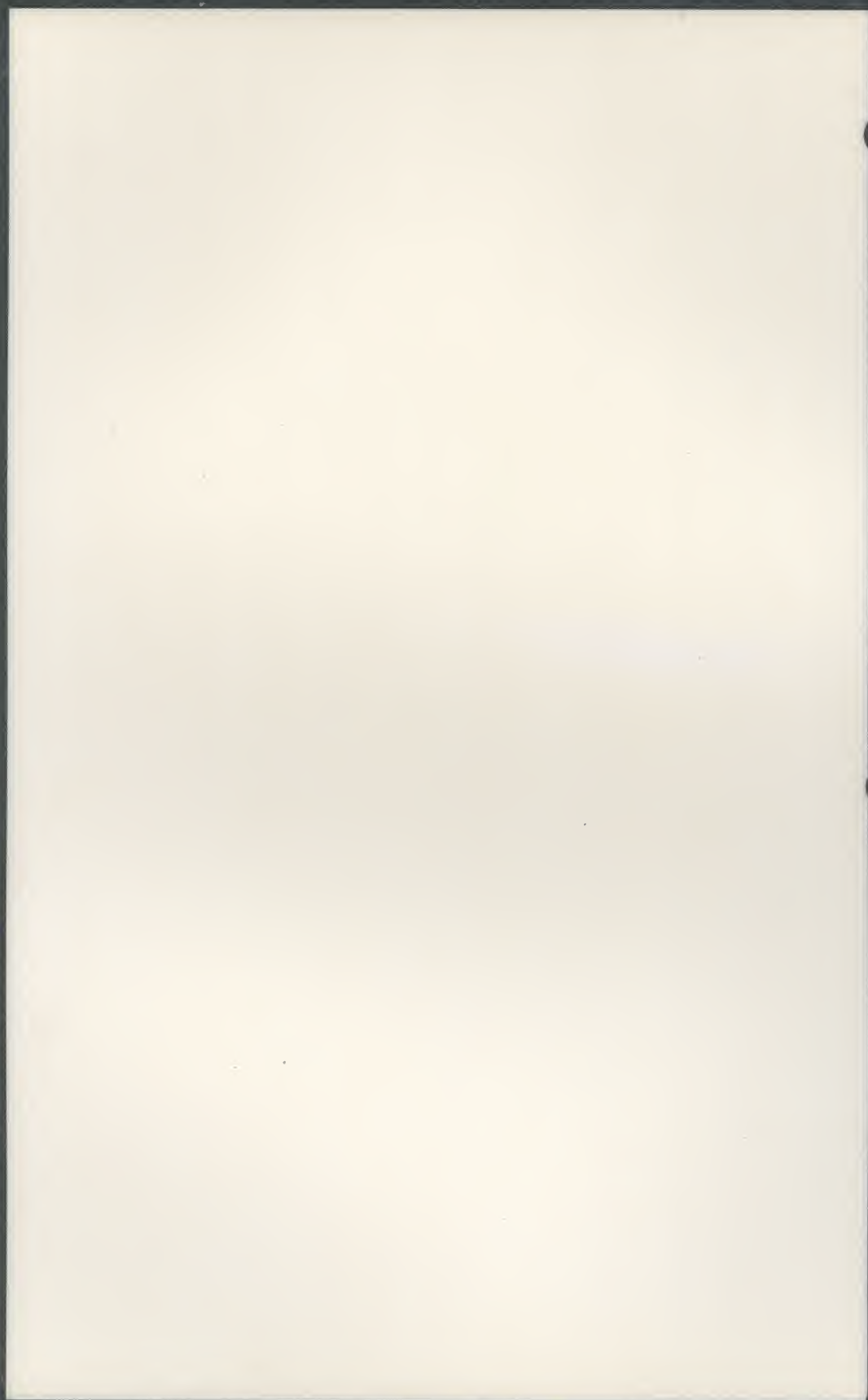


Fig. 309.—Cyst open; forceps in femoral canal.

some difficulty (Fig. 309). The sac was excised and the opening closed after the manner of repairing a femoral hernia. The patient's recovery was uneventful.

This condition occurs rarely, and usually when there has been some irritation, such as wearing a truss; this had not been done in this case. In a casual review of the literature, we were unable to find a similar case; nevertheless such cases may occur frequently but have not been reported.





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**PERFORATION OF THE GALL-BLADDER IN ACUTE  
CHOLECYSTITIS\***

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AND

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**OF ROCHESTER, MINN.**

FROM THE DIVISION OF SURGERY OF THE MAYO CLINIC

PERFORATION of the gall-bladder is unusual. It is comparable to perforation of any other viscus. The condition is most frequently confused, pre-operatively, with inflammation in a high-lying appendix, perforation of an ulcer of the stomach or duodenum, or acute pulmonary disease. However, an inflammatory process in the appendix may be so acute that it progresses to gangrene and perforation within a few hours. The gall-bladder rarely perforates during the first attack. Consequently, adhesions form, and when perforation does occur, the process usually remains localized about the viscus. Perforation in such a way that material runs free into the peritoneal cavity is rare, and when it does occur it constitutes a very difficult problem in accurate pre-operative diagnosis. In the majority of instances the true nature of the condition will not be revealed until the abdomen is opened and a bile-tinged exudate is found in the peritoneal cavity. Thick, oedematous walls may give the appearance of distention, but in reality the gall-bladder rarely bursts from overexpansion. Perforation is probably always due to ulceration or local gangrene of a part of the wall.

In reviewing the cases of acute cholecystitis in which operation has been performed at The Mayo Clinic in the last ten years, we found sixty-one in which the gall-bladder had perforated. In only two of these was there extravasation of content into the general peritoneal cavity. In the remaining fifty-nine cases the process was well localized. Forty-three of the patients were women and eighteen were men. The oldest patient was aged sixty-eight years and the youngest twenty-four, but by far the majority of patients were more than fifty years of age. That the accident tends to afflict older persons is in part because the blood supply to the organ is poorer with advancing years. When the process has been going on for some time and the function has been diminished, the chance of recovery is impaired while that of necrosis and leakage is increased.

All of the patients had had symptoms referable to the biliary tract. Eight had undergone cholecystostomy. Forty-eight had had acute symptoms previously. Some were in the midst of an acute attack when they arrived for consultation. However, the majority had gone through most of the acute symptoms before we saw them. The average duration of the attack before consultation at the clinic was fourteen days. The length of the period of

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\* Submitted for publication April 26, 1933.



observation depended on the condition of the patient; the average was six days, making the average time from the onset of the attack to operation twenty days. Colic was the chief and most common symptom; it was present in fifty-four cases. Sixteen of the patients had some degree of jaundice. Leucocytes numbered more than 10,000 in each cubic millimetre of blood in twenty-five cases; in seven of these, more than 20,000. Tenderness in the right upper abdominal quadrant was a constant finding. A mass could be felt in the region of the gall-bladder in twenty-seven instances.

Localized peritonitis was evident in all of the sixty-one cases. Gangrene in one or more areas of the wall of the gall-bladder was present in eleven cases at the time of cholecystectomy, and there was associated empyæma in twenty-two. Stones were found in the gall-bladder in fifty-six cases. They would be expected in a large proportion of cases, for acute cholecystitis without stones is uncommon. In the past it has been the general opinion that calculi in the common bile-duct are uncommonly coincident with a perforated gall-bladder. However, stones were found in the common bile-duct in nine of our sixty-one cases. It is possible that they were present at one time or another in a greater proportion of the cases, for many of the patients had had repeated attacks referable to the biliary tract.

The severity of the symptoms does not always indicate the extent of the pathological process, for in some instances it progresses to the stage of perforation and abscess without producing acute pain or other abdominal disturbance. The experience of one of the patients, a woman aged forty-three years, is typical. For two years she had had a "drawing feeling" in the epigastrium, moderate dyspepsia, and loss of appetite. One month before she came for consultation she had had generalized abdominal pain which had lasted an hour. It had been relieved by hot applications and once by vomiting. The woman never had been obliged to go to bed. With the exception of tenderness about the umbilicus, there was no indication of an abdominal pathological process. Analysis of gastric content disclosed that there was no free acid in the stomach. Two physicians were of the opinion that a cholecystic process might be present. At operation empyæma of the gall-bladder was found and it was evident that the gall-bladder had ruptured into the liver. Many stones were present. The appendix was involved in an inflammatory process. Cholecystectomy and appendectomy were performed. Two Penrose drains were used. Convalescence was uneventful.

Cholecystectomy was performed in forty-eight of the sixty-one cases with five deaths; cholecystostomy in thirteen with one death. Half of the deaths were associated with pulmonary complications. The coincidence of acute cholecystitis and pulmonary processes has been emphasized; undoubtedly the close proximity of the infected gall-bladder to the diaphragm is the predominant factor in this situation. Death is frequently attributed to the pulmonary complication.

Perforation of the wall of the gall-bladder, with leakage of the content into the abdominal cavity, is probably of more frequent occurrence than our

13. Curability of carcinoma of the ovary, Proc of staff Meet. of Mayo Clinic. 8:620-623 (October, 11, 1933, with Dr. E.S. Judd)
14. Curability of carcinoma of the lip. Proc. of Staff Meet. Mayo Clinic. 8:637-640 (October 18, 1933 with Dr. E.S. Judd)



#### PERFORATION OF GALL-BLADDER

series indicates. When the accident occurs the patient is too sick to travel; consequently the attending physician does not refer the patient to us but gives emergency attention at home. Ordinarily we see only those patients who can be brought a short distance or whose condition undergoes acute exacerbation while they are en route to us for consultation.

In reviewing the cases of acute cholecystic disease of the last ten years, in which the patients had died without having an operation on the gall-bladder, we found three in whom perforation of the viscus had occurred with ensuing general peritonitis. The reason that surgical interference was not undertaken was that the patients were practically moribund on admission.

In the two cases of our series in which perforation of the gall-bladder occurred in such a way that material ran free into the peritoneal cavity, one of the patients survived. Immediate surgical intervention is imperative in such cases. When the infection is localized an abscess forms. This was the most common eventuality in our series. The presence of a palpable mass in the upper right quadrant of the abdomen should arouse suspicion of the presence of the condition. Cholecystostomy, or cholecystectomy with free drainage of the abscess, is indicated.

Perforation into an adjacent viscus may occur. This happened in seven of our sixty-one cases. It resulted in six cholecystoduodenal fistulas and one cholecystocolonic fistula. Because the gall-bladder and the duodenum are so intimately associated, it is difficult at times to determine whether a perforated duodenal ulcer has disseminated its infectious products into the gall-bladder, or whether the gall-bladder is the chief offender and has perforated into the duodenum. Rupture through the abdominal wall was observed in two cases, in both of which previous operations on the gall-bladder had been performed. In these cases, probably the viscus had been sutured to the abdominal wall at the time of the previous procedure or had become adherent in the scar.

Even under the existing circumstances, the post-operative convalescence of some of these patients is smooth, apparently because vaccination against the infection has taken place, or because the primary condition was not the result of infection.



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## ACUTE CHOLECYSTIC DISEASE

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IN ACUTE and subacute cholecystitis, one of the outstanding features from a microscopical standpoint is the presence of oedema of the wall of the gall-bladder. The interstices of the tissue are filled with fluid. In acute cholecystitis the walls are also infiltrated with leucocytes. In subacute cholecystitis, there is a relative decrease of the proportion of polymorphonuclear neutrophils and replacement of them by lymphocytes and plasma-cells.

Often a condition is found which is designated as acute or subacute cholecystitis on a chronic cholecystitis. Such a diagnosis is made when, in addition to the other features, it is possible to demonstrate an excess of fibrous tissue in the walls of the gall-bladder. From a macroscopical standpoint, this excess fibrous tissue is usually denoted by unusual trabeculation.

Gangrenous cholecystitis occurs more often than was formerly thought. Gangrene may be mistaken for phlegmonous cholecystitis. In a few cases we have observed the gall-bladder completely separated from the surrounding attachments, so that it could be removed without dissection.

*Etiology.*—Continued studies seem to support the idea that cholecystitis is not always the result of infection. In some instances, using every known means, and following the most careful technic, it is not possible to find causative bacteria. It might be assumed that bacteria had been present in the tissues at some time, or that they had been present at the time of examination but had not been found. However, there is evidence that the changes observed are not always the result of bacterial invasion for similar lesions of the gall-bladder have been produced by introducing certain chemicals into the blood-stream of experimental animals. Furthermore, what part disturbances of metabolism play in the etiology of cholecystitis is not known. The significance of deposits of lipid in the wall of the gall-bladder is not well understood. Possibly the deposits are the result of a simple physiological process, but their presence in cases in which there is clinical evidence of cholecyctic disease makes one wonder what part they really play.

*Precedent and Opinion.*—Experience has added much to knowledge but apparently there is still a great deal to be learned before there will be an invariable set of clinical criteria that will establish the diagnosis and determine the immediate course to be pursued. Men of wide experience hold



opposing views: a well-known surgeon has stated that cholecystectomy during the acute stage of the disease entails unwarranted danger, but a surgeon of international repute has recommended immediate operation, with cholecystectomy as the objective.

Love, in the Hunterian Lecture given in 1929, said that until recently the trend had been to allow the acute inflammation to subside and then to perform cholecystectomy after remission of symptoms. He reported that Hotz, in 1923, produced figures indicating that the mortality from operation during the acute attack is double that following surgical treatment after subsidence of symptoms. Pauchet, in 1926, subscribed to the opinion of the French schools, that if operation is indicated during an acute attack, drainage of the gall-bladder is preferable. The opinion expressed by Love was that there are two main objections to delayed treatment: First, the patient may, to his detriment, refuse subsequent operation. In Love's series of sixty-nine cases in which the acute condition was given time to subside, there were seventeen in which operation was not performed subsequently. The second objection is that there is a greater possibility of erroneous diagnosis, since perforated ulcer, acute intestinal obstruction, pancreatitis, and inflammation of a high-lying appendix may all be mistaken for acute cholecystitis. Love found that the mortality in all cases in which expectant treatment was given was 13 per cent., and that intervention was necessary in nine cases of fifty-two in which treatment was along expectant lines. In two cases general peritonitis occurred following gangrene of the gall-bladder. Love concluded that operation during an acute attack of cholecystitis carries a high mortality rate; in his series of cases it was 21 per cent. Furthermore, he stated that in most cases in which expectant treatment is given the condition will subside.

In Zinninger's study of eighty-nine cases of acute disease of the gall-bladder, thirty-five patients were operated on immediately after admission, and fifty-four were observed for from one to twelve days before operation. Of those who were kept under observation, the condition of only 37.7 per cent. was improved, and the gall-bladders of these were found subacutely or chronically inflamed at operation. No significant change in signs or symptoms was observed in 35.1 per cent. of the cases during the period of observation; uncomplicated acute cholecystitis and empyæma were the lesions most frequently found at operation. In a third group, composed of 27.7 per cent. of the entire series, the patients grew definitely worse during observation, and empyæma, gangrene, or rupture of the gall-bladder was found. The total number of cases in which symptoms and signs failed to subside was thirty-four (62.9 per cent.). Zinninger made considerable of the fact that the average total number of leucocytes in these cases was more than 15,000 in each cubic millimetre of blood. He wrote that in all cases of empyæma it was more than 15,000. He also expressed the belief that the incidence of serious pathological lesions and the mortality rate rose with the duration of the attack and that, with early operation, the stay of the patients in hospital and the mortality rate were less. Zinninger recommended that in the presence of acute infections of the gall-bladder, immediate operation be performed if the symptoms are severe, and particularly if there is an associated high leucocyte count. He gave the opinion that early operation is indicated if the attack fails to subside promptly. In the cases which he studied, operation was performed between 1925 and 1930, and, I believe, by a number of different surgeons.

Graham reported on early operations for acute cholecystitis, and concluded that early operations give better results. He wrote that in a series of cases in which operation was delayed, many of the deaths could be attributed to the delay, longer and more difficult operations were necessary, and the number of post-operative complications and of days in hospital were increased.

Miller reported that if there is persistence of increased temperature, tenderness, and

*Positive  
gangrene?*



## ACUTE CHOLECYSTIC DISEASE

spasm, and most important, if there is severe pain that is not easily controlled, surgical intervention should be undertaken without delay. He selected 200 cases in which operation was performed for acute cholecystitis. In the fatal cases, the average duration of symptoms from onset to operation was fifteen days, and in the cases in which the patients recovered, 8.2 days. He said that the reason for the long time between the onset of symptoms and operation was that the patients were sick at home before they came to the hospital. In any event, there is a striking difference between the two groups. In the fatal cases, palliative treatment had been given for an average of a week longer than in the cases in which the patients recovered.

*Symptoms May Be Masked or Inadequate.*—That it is not always possible to estimate the condition until the abdomen is opened is illustrated by the following experiences: In a recent article, Mentzer stated that in four instances perforation of the gall-bladder occurred while the patients were under observation and the condition was not recognized before death in any of the cases. In the course of a number of years we have encountered seven cases of acute cholecystitis in which general abdominal infection developed while the patients were under observation. In none of these cases were we able to recognize symptoms that would suggest disease of the gall-bladder, and it was not suspected that rupture of the viscus was the cause of the trouble until this was revealed at necropsy. In view of the results of our present study, we believe that in all cases in which there is acute abdominal distention and paresis from peritonitis, and in which there is no evidence of the source of the disturbance, the gall-bladder should be suspected of being the site of origin.

In addition to these seven unrecognized cases, we have found acute cholecystic disease present eighteen times at necropsy although the condition of the gall-bladder was not responsible for the death. In all of these the symptoms usually referable to disease of this viscus were either overshadowed or were not present.

*Results in 508 Cases of Acute Cholecystitis.*—In these 508 consecutive cases of acute cholecystitis in which we shall report the results of operation, 196 of the patients were males and 312 females. Of these patients, 248 had their first acute symptoms during the attack in which they consulted us, and in thirty-eight of these cases the attack marked the onset of symptoms. Two hundred and twenty-two patients had experienced previous spells of acute abdominal pain and digestive disturbance. Colicky pain and tenderness in the upper part of the abdomen were the outstanding complaints. Of the 508 patients, 332 had had pain of a colicky nature. In every instance the abdomen was tender. The records also revealed that in ninety-eight instances there was a palpable mass in the upper part of the abdomen.

The body temperature was elevated at the time of the examination in only 106 of our cases. In fifty-three, leucocytes numbered more than 15,000 in each cubic millimetre of blood. It was interesting to find that in 354 of the 508 cases leucocytes numbered between 5,000 and 10,000, in four less than 5,000. In other words, in the majority of instances, the leucocyte count was within normal limits and entirely out of proportion to the severity and extent



of the existing infection in the biliary tract. This may tend to support the idea that infection is not responsible for the condition of the gall-bladder in many of these cases.

Stones were present in the gall-bladder in 484 cases. Forty-three of the patients also had calculi in the common bile-duct.

The pathological changes in acute appendicitis have been compared with those of acute cholecystitis, and it has been found that generalized infection of the peritoneum is a much less common complication with inflammation of the gall-bladder. When the gall-bladder becomes inflamed, it is rapidly shut off by adhesions, so that perforation of the viscus into the general peritoneal cavity is an uncommon event. Turgidity may be confused with distention. The walls of oedematous gall-bladders which are the site of acute disease are often one-half inch (1.27 centimetres) or more thick. It is easy to imagine at operation that the gall-bladder is on the point of bursting, and that the operative procedure has fortunately just averted this calamity. Perforation is probably due, in all cases, to local gangrene of the wall of the viscus, although popular opinion pictures the gall-bladder as bursting like an over-blown balloon. In sixty-eight cases of our series, the wall of the gall-bladder was gangrenous. It had perforated in sixty-one cases, with formation of an abscess about the viscus in thirty-eight. In three cases it ruptured into the general peritoneal cavity and general peritonitis ensued. The disease of the gall-bladder was responsible for the formation of a cholecystoduodenal fistula in six cases; in one case there was a cholecystocolonic fistula. That the infection was not only acute, but also was extensive, is shown by the fact that definite involvement of the pancreas was recorded in eighty-one of the 508 cases, and this figure probably does not adequately express the frequency of such a situation.

Cholecystectomy or the removal of all of the gall-bladder except the portion embedded in the liver was performed on 419 of our patients. Eighty-nine underwent cholecystostomy. It was found necessary to open the common bile-duct and to establish drainage of the biliary tract in seventy-two of the cases, in addition to the procedure referable to the gall-bladder itself. There were nineteen deaths following cholecystectomy and five following cholecystostomy.

*The Time for Operation in Cases of Acute Cholecystitis.*—A review of the literature shows that there is considerable difference of opinion regarding the time for surgical treatment in cases of acute cholecystic disease, and regarding the question of whether it is ever permissible to consider an emergency procedure. In fourteen of our cases, the operation was performed as an emergency measure. One of the patients died. In this instance, cholecystectomy was performed for acute gangrenous cholecystitis with stones. Death resulted from general peritonitis and terminal bronchopneumonia.

We shall probably not be able to settle the question of when to operate in the acute cases, but the present tendency is to carry out surgical treatment



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early in cases of acute cholecystic disease. Apparently there is not the same fear of operating in these cases as there formerly was. We are inclined to think that this is due to recognition of the fact that infection is not always the cause of the condition and that these patients can have the necessary surgical treatment with comparative safety. In these acute cases, the operation usually should be removal of the gall-bladder. Our study of this group of 508 surgical patients would seem to bear out these conclusions although the operations were performed by several surgeons, among whom there were bound to be differences of opinion.

Although we wish to subscribe to the plan of early operation in acute cholecystic disease, and although this coincides with the opinion expressed in the more recent literature on the subject, nevertheless we feel that there are certain instances in which surgical treatment should be postponed. In some cases it should be delayed for a long time. In caring for these patients it will be necessary to consider each one as presenting an individual problem. There is no set plan that will fit all cases. The following illustrates the type of case in which we believe operation should be postponed:

A man, aged fifty-six years, registered at the clinic October 26, 1932. He had had attacks of severe epigastric pain over a period of seven months, but the last attack had occurred seven months previous to the time when he came for consultation. Vomiting had accompanied the attack.

On examination, his temperature, pulse rate and leucocyte count were normal. While röntgenological examinations of his biliary tract were being carried out he had a more severe reaction than usual. There was epigastric tenderness and rigidity. At the first examination after the röntgenological investigations, leucocytes numbered 10,300 in each cubic millimetre of blood, the temperature was 98.2° F., and the pulse rate seventy beats each minute. The next day the patient was definitely having one of his attacks and for a month afterward his temperature ranged from 100° to 105° F. The number of leucocytes varied from 15,000 to 22,000 in each cubic millimetre of blood. There was marked tenderness in the left upper abdominal quadrant, distention, and a palpable epigastric mass. At the height of the attack, the value for bilirubin was 2.1 milligrams in each 100 cubic centimetres of serum. After this pneumonia developed and the patient seemed altogether too sick to be operated on. Finally infection from gas bacilli developed in the left buttock. After the man had passed through all of this difficulty, and had been in the hospital for six weeks, it was decided that the best plan would be to proceed with the operation.

At the time of the operation, both subphrenic spaces were examined for fear that infection might be present there, but these spaces were normal. So far as could be determined there was no abscess anywhere. There were many adhesions around the gall-bladder, but no sign of general peritonitis. The gall-bladder was opened, and stones and pus were removed. Three days after operation the patient's temperature was normal and remained normal. The man has made a very satisfactory recovery.

Whether the attack was precipitated by the röntgenological examinations is difficult to determine. It is known that in some cases of disease of the gall-bladder an attack is precipitated in this way, but we never have seen one as severe as this. We are inclined to think that if operation had been performed early the patient would not have survived the operation.

*The Type of Operation.*—Cholecystectomy will not be permissible in



every case, but this procedure should be carried out whenever feasible. This conclusion has been reached after watching the patients during their immediate convalescence and evaluating the ultimate results. It has been our experience that leaving the acutely inflamed gall-bladder *in situ* may result in continued drainage, pancreatic fistula, and then, after a number of weeks, death of the patient probably due to continued absorption. The thick-walled gall-bladder in an acute state can be removed as readily as one that has reached the chronic stage, and it seems that there is a definite advantage in removing this infected tissue.

No one would feel that a deeply situated, inaccessible, acutely inflamed gall-bladder should be removed from an extremely sick person. Cholecystostomy may be all that is warranted. However, some of these patients will have fistulæ which will persist until cholecystectomy is performed. In other instances, the gall-bladder undoubtedly shrivels and is eventually almost entirely destroyed by the inflammatory process. If cholecystectomy is finally performed in this type of case, every effort should be made not to traumatize the surface of the liver. To avoid this, a sufficient amount of the fibrous wall of the gall-bladder should be left on the surface of the liver to prevent extension of the disease into the hepatic substance.

Ordinarily the common bile-duct should not be opened during operation for acute infection in the gall-bladder. Usually it is inaccessible. There may be a great deal of œdema of the adjacent structures, making it difficult to recognize the duct. In most instances the disturbance is confined to the gall-bladder, and the condition is not complicated by the presence of stones in the common bile-duct. If the clinical history suggests the presence of a stone in the duct, or if a calculus can be felt in it, then an attempt should be made to clear that situation.

*Summary and Conclusions.*—In many cases infection is undoubtedly the principal factor in the changes observed in the gall-bladder and biliary tract. In other instances in which there is no detectable infection, however, the reaction in the tissues seems identical. Experimental studies seem to indicate that this may be the result of some alteration in the chemical reactions of the body. With changes in metabolism, lipoids may be deposited in the wall of the gall-bladder. Future investigations may prove that this phenomenon plays an important part in the disturbances occurring in the biliary tract.

Cholecystectomy is preferable to cholecystostomy in all cases in which the condition of the patient will permit carrying out the operation without unwarranted risk. In a small proportion of the cases cholecystostomy will be indicated.

The results obtained in our series of cases seem to justify the plan of operating early in cases of acute cholecystic disease.



## THE PATENCY OF BILIARY DUCTS

DETERMINED BY RADIOPAQUE OIL INJECTED THROUGH A T TUBE PREVIOUSLY PLACED IN THE COMMON BILE DUCT FOR THE PURPOSE OF PROLONGED DRAINAGE

E. STARR JUDD, M.D., F.A.C.S., AND J. ROBERTS PHILLIPS, M.D., ROCHESTER, MINNESOTA

The Mayo Foundation

AS HAS been pointed out, prolonged drainage of the biliary tract is advisable under certain conditions, such as removal of stones from the common bile duct, infection and suppuration in the biliary tract, and reconstruction of the duct over a T tube. Whenever the common bile duct is opened for any purpose, a tube should be left in the duct. If a T tube is employed, complete control of the flow of bile can be maintained; the bile may be allowed to discharge freely to the outside through the long arm of the T tube or it may be forced into the duodenum by clamping off the tube. In certain instances drainage by this method has been continued for as long as a year. We have not had the experience of having a stricture of the duct follow the procedure, and if the duct is patent there is no danger that a biliary fistula will persist after the tube is removed.

It is always desirable to know just what has taken place in the biliary tract and whether the ducts are patent, before removal of the tube is considered. From a clinical standpoint, this can be determined fairly accurately. One can be sure that the duct is patent if there is no discomfort in the upper part of the abdomen, no jaundice observed either clinically or by tests of serum, if the stools are of normal color, and if there is no leakage around the tube during the time that it is clamped off. However, in certain instances, although the ducts are wide open, only a small quantity of bile will be discharged. This is indicative of the degree of hepatic injury that has occurred. The jaundice will be slow to subside, and the stools will be slow to take on a normal color. Any measure that can be carried out that will give a better understanding of the whole situation will be advantageous.

In the past, visualization of the common bile duct was possible only occasionally, if there was a reflux into the biliary tract after an opaque meal. Sometimes other biliary radicals were seen. Venables and Briggs reported 2 cases of visualization of the biliary ducts after a barium meal. In 1 of these a stone in the common bile duct had trapped some barium above its level in the duct. In the other case there was obstruction high in the jejunum and medium was forced into the

common bile duct, gall bladder, and some of the biliary radicals. Visualization has also been made possible by injecting medium through a tube placed in the gall bladder or in the stump of the cystic duct after cholecystectomy. Sometimes, following the Graham-Cole test, both the gall bladder and the common bile duct are visualized.

A new method of studying the biliary tract was suggested to Gabriel by the publication of Ginsburg's and Benjamin's study of biliary fistula by the injection of lipiodol. Gabriel injected a radiopaque oil through the T tube that had been placed in the common bile duct for drainage. Overholt employed this method, and reported results in a series of cases. With this procedure, it is possible to prove definitely the patency of the ducts while the T tube is still in position. Sometimes the medium reaches the smaller biliary passages, and an opportunity is given to visualize these radicals and obtain a better understanding of the existent pathological processes.

We have used this method in 40 cases. The patient is placed under the fluoroscope and the radiopaque oil is injected; thus the passage of the medium through the biliary tract may be watched. It is not wise to carry out the procedure if patients have recently had chills or fever. The patients in our series have all been ambulatory; in no instance have injections been made earlier than 2 weeks after operation. Although the literature contains an occasional report of ill effects from the procedure, we have not had such experience. After the fluoroscopic examination, more of the medium is injected into the tract through the T tube, and a flat plate of the abdomen is made. In some cases we have used as much as 15 to 20 cubic centimeters of the solution.

If the liver has not been injured, and the common bile duct is not obstructed, the medium will flow into the duodenum so freely and so quickly that visualization of the biliary radicals is not possible. The following case is illustrative.

CASE 1. A woman, aged 38 years, gave a history indicative of chronic cholecystic disease, existing for several years. Operation revealed chronic cholecystic disease without stones. The common bile duct was thick walled and





Fig. 1. Radiopaque oil injected through T tube which was placed in common bile duct 3 weeks previously. The distribution of this medium reveals that the ducts are patent.



Fig. 2. Radiopaque medium injected in dilated common bile duct, fills the duct; there is no medium in bowel. The biliary tract was drained by T tube for 6 months after removal of stones from the common bile duct.

about three times normal size. When it was opened, the bile appeared normal, but was under some tension. No calculi, but definite cholangitis was present. A T tube was inserted into the duct for the purpose of prolonged drainage of the biliary tract, and cholecystectomy was performed. The tube was left in place for 3 weeks, and before its removal, opaque medium was injected into the tract; this revealed that the ducts were patent, since the oil flowed freely into the duodenum, and there was no evidence of its presence in the biliary tree when a flat plate of the abdomen was made (Fig. 1).

If the function of the gall bladder has been completely destroyed by disease, there will usually be dilatation of the common bile duct and other biliary radicals. This may even be more manifest if there is also obstruction of the duct, such as is caused by stone. Insertion of the medium in these cases will show the dilatation of the duct and often some of the medium will reach the smaller biliary radicals. This is illustrated in the following case.

CASE 2. A man, aged 42 years, had had recurrent attacks of pain in the right upper quadrant of the abdomen for 20 years. Jaundice was sometimes present. A diagnosis was made of chronic cholecystitis with cholelithiasis and stone in the common bile duct. At operation it was found that the gall bladder was large and cystic, and that its function had been completely destroyed. The common bile duct was dilated and contained calculi. There was stony material in the ampulla of Vater. Cholecystectomy was performed and after removal of the debris from the common bile duct, a T tube was inserted for prolonged drainage; it was removed at the end of a month. After the patient had gone home he had two severe attacks of pain in

the right upper quadrant of the abdomen without jaundice. Eight months later he returned because of further attacks. A second operation revealed that the common bile duct was thick walled and dilated to about four times normal size. The bile in the duct was under some tension. One large stone and several smaller ones were removed, after which a tube passed readily into the duodenum. A T tube was placed in the duct to insure free prolonged drainage. After it had been in place 6 months, radiopaque oil was injected through the T tube and the ducts were found to be markedly dilated, but patent. Some of the medium even entered the smaller biliary radicals. There had been no recurrence of symptoms, and no discomfort on clamping off the tube for as long as 24 to 48 hours. The patient felt that he was in good condition. We were certain that the ducts were patent, and that the opening in the duct would close promptly after removal of the tube. This proved to be the case (Fig. 2).

In 1 case the greater part of the biliary tree was well visualized, including some of the smaller radicals, yet there was no obstruction to the flow of the medium into the duodenum. The common bile duct was open. The wide dispersal of the medium through the biliary tree was undoubtedly made possible by the compensatory dilatation. Intermittent obstruction of the duct by stone over a period of years had undoubtedly increased the dilatation.

CASE 3. The patient, a man aged 34 years, had had severe colic in the right upper quadrant, associated with chills and jaundice, over a period of years. Two years before our examination, his gall bladder had been drained, with temporary relief of symptoms. One year later cholecystgastrostomy was performed without relief. During





Fig. 3. T tube drainage of common bile duct for 5 months following removal of stones; medium injected through T tube flows freely into duodenum; the biliary tree is well visualized.



Fig. 4. Common bile duct drained for 2 months with T tube, following removal of stones from the ampulla; injection of radiopaque medium revealed that duct is obstructed; lateral choledochoduodenostomy was necessary 19 months later.

this period he had become addicted to morphine because of continuance of the colic-like pain and the associated jaundice. A diagnosis was made of stone in the common bile duct. Exploration disclosed that the gall bladder was anastomosed to the stomach. The anastomosis was disconnected and the opening in the stomach closed. The common bile duct was then opened. It was filled with foul bile under tension, many small stones, and much mucus. After removal of the calculi, a curved forcep passed readily into the duodenum. A T tube was placed in the duct for prolonged drainage, and a dressed tube was stitched into the gall bladder. The liver was infected, and there was rather extensive enlargement in the head of the pancreas. Five and a half months after this operation, the patient returned. He was in good condition. There was no external drainage through the long arm of the tube, no jaundice, and stools were of normal color. The ducts were studied by injection of the opaque medium and found to be patent. The tube was then removed from the duct without difficulty. There was slight drainage of bile afterward, but the patient was able to start for home the following day. He reports that he has remained well (Fig. 3).

Should discomfort arise on clamping off the external branch of the T tube, or should jaundice increase, one can be reasonably certain that there is some obstruction in the duct. The use of radiopaque oil will disclose the condition, which is illustrated by the following case.

**CASE 4.** A man, aged 62 years, had had cholecystectomy performed in 1930 because of cholecystic disease with stones. He came to the clinic 7 months later with an external biliary fistula and obstructive jaundice, which was due to a stone in the common bile duct. In spite of the

drainage of bile to the outside, the jaundice had persisted. At operation, it was found that the liver was slightly atrophic. The common bile duct was tremendously dilated and easily admitted the first finger. Stony material was removed from the ampulla of Vater. There was some inflammation in the tissues at the lower end of the common bile duct. The head of the pancreas was enlarged. The right hepatic duct was not seen. A T tube was inserted into the common bile duct with the idea that it was to remain until the jaundice subsided. It was thought at the time that lateral anastomosis between the common bile duct and the duodenum might be necessary later. However, we were sure the duct was open at times, since bile was recovered from the duodenal contents. Injection of the opaque medium through the T tube showed that the duct was tremendously dilated.

The T tube was removed 2 months after its insertion. The fistula gradually closed. Nineteen months after removal of the tube, lateral anastomosis between the duodenum and the common bile duct was necessary on account of jaundice and colic. Posterior gastro-enterostomy was made at the same time, because of impending duodenal obstruction (Fig. 4).

#### CONCLUSIONS

We feel that this method of determining the patency of the common bile duct affords a better understanding of postoperative conditions in the biliary tract which have necessitated drainage by the T tube. Should obstruction exist, its extent can often be ascertained. If the ducts are found to be patent, it may be assumed that there will be no external drainage on removal of the tube. Thus knowledge concerning individual cases will be



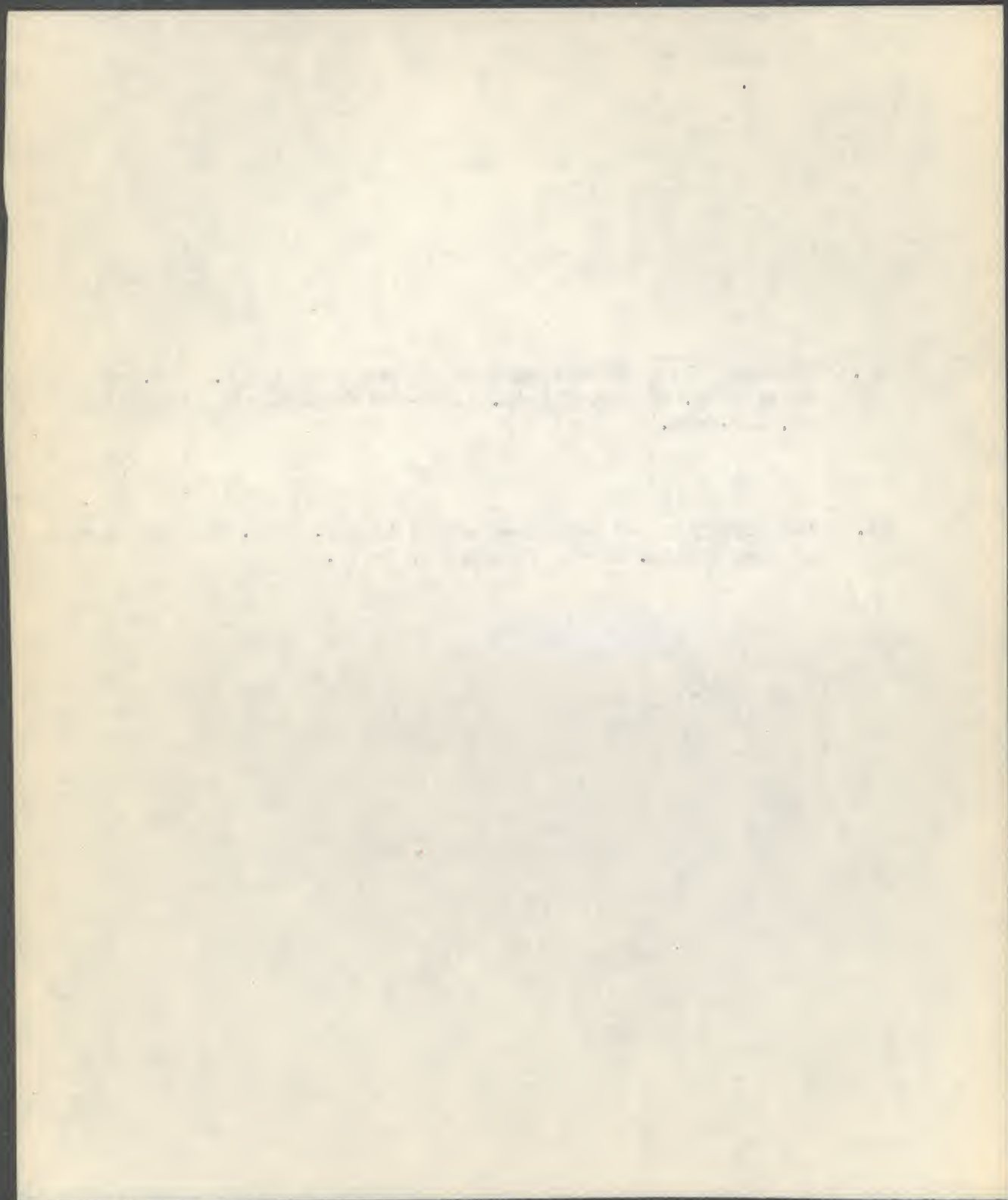
more complete, and the final results can be more definitely estimated.

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Bilateral Pneumothorax and Extensive  
Subcutaneous Emphysema Complicating Gastric Resection

Report of a Case

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# BILATERAL PNEUMOTHORAX AND EXTENSIVE SUBCUTANEOUS EMPHYSEMA COMPLICATING GASTRIC RESECTION

## Report of a Case

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**A**N extensive subcutaneous emphysema associated with bilateral pneumothorax following an abdominal operation must be a rare occurrence. We have found no similar report in the literature.

## REPORT OF CASE

A white male, 29 years of age, had had symptoms of stomach trouble for fourteen years. A definite diagnosis of duodenal ulcer was made when he was 18, and Sippy treatment gave complete relief. The trouble recurred, however, in a year and, though not seasonal, was intermittent up to the present. During these ten years he had been on very strict diets for various lengths of time. He is a salesman who works under high pressure and has not been able to take proper care of himself.

One year ago he was treated for a depression state and at the same time made a slight change in his occupation. However his stomach trouble was not obviated; it progressed until it was almost unbearable. Pain radiated through to the back and occurred severely at night associated with vomiting.

X-ray examination showed a deformity of the duodenum with a crater on the posterior wall. The patient wished to avoid operation and was put in a hospital on a strict medical regime. There was temporary improvement but night pain and retention were uncontrollable. For relief it was necessary to administer a narcotic and even that had little effect. He was urged to submit to surgery.

On Feb. 6, 1937, exploration through a high left rectus incision revealed a subacute duodenal ulcer, which had perforated onto the pancreas, forming an inflammatory mass about 2 cm. in diameter. The stomach was divided above the pylorus and it was possible to invert the distal end satisfactorily in spite of the inflammatory reaction in the duodenum. After removal of five-sixths of the stomach, the operation was completed as a posterior Polya procedure.

Examination of the specimen revealed an extensive hemorrhagic gastritis.

The patient did not take the gas-ether anesthetic well, and at the end of the operation, the anesthetist noticed a slight swelling of his neck. By the time the patient had reached his room, this swelling had spread over the entire anterior chest, shoulders and neck, and was definitely extensive subcutaneous emphysema. There was difficulty in breathing and marked cyanosis. Oxygen therapy was started at once. The emphysema increased for several hours and then seemed to remain stationary.



The next day the temperature reached 103.4. On the day following, a bedside x-ray of the chest showed a partial pneumothorax on the right side, the upper lobe only being collapsed. The right lung seemed adherent to the lateral chest wall at the second interspace. Air was present in the subcutaneous tissue.

The emphysema began to decrease on the second day and was gone by February 15. The patient had, however, a rather severe cough and was expectorating much mucopurulent material.



Fig. 1. There is a pneumothorax compressing the right upper lobe with practically complete collapse. The lower lobes show no collapse.

When he was fever-free on February 17, he was taken to the x-ray room for a stereoscopic roentgenogram, which showed a bilateral pneumothorax with the right upper lobe entirely collapsed and a large amount of air over the entire left lung. At this time there was still a good deal of drainage from the wound, apparently from the site of the perforation onto the pancreas. As the coughing continued there was some drainage, which must have come from a small duodenal fistula which subsequently closed.

On February 22, another x-ray showed less air in both pleural cavities, and the patient was allowed to leave the hospital. At that time the stomach was working well on frequent feedings of selected food. A little drainage from the incision continued and an aggravating cough persisted. During the next two weeks there were two or three episodes of sudden dyspnea following exertion, and it was found on examination of the chest that there had been an increase in the extent of pneumothorax, especially on the left side. Apparently a bronchial fistula had been reopened. After these episodes stopped, the patient progressed satisfactorily and has since been taking a general diet. He is carrying on his normal duties at this time without any gastric or pulmonary distress.

The mechanism producing this unusual complication is hard to explain. It seems to us most likely that there were bilateral emphysematous blebs and, following strain of anesthesia, one rup-

tured on the right side, followed by pneumothorax and a passage of air up through the mediastinum into the neck and over the chest. For the pneumothorax to develop on the left side at a later date, it is probable that in a coughing spell another emphysematous bleb ruptured on this side. It does not seem possible that there was enough pneumothorax on the right side to push across the mediastinum and cause a pneumothorax on the left side.

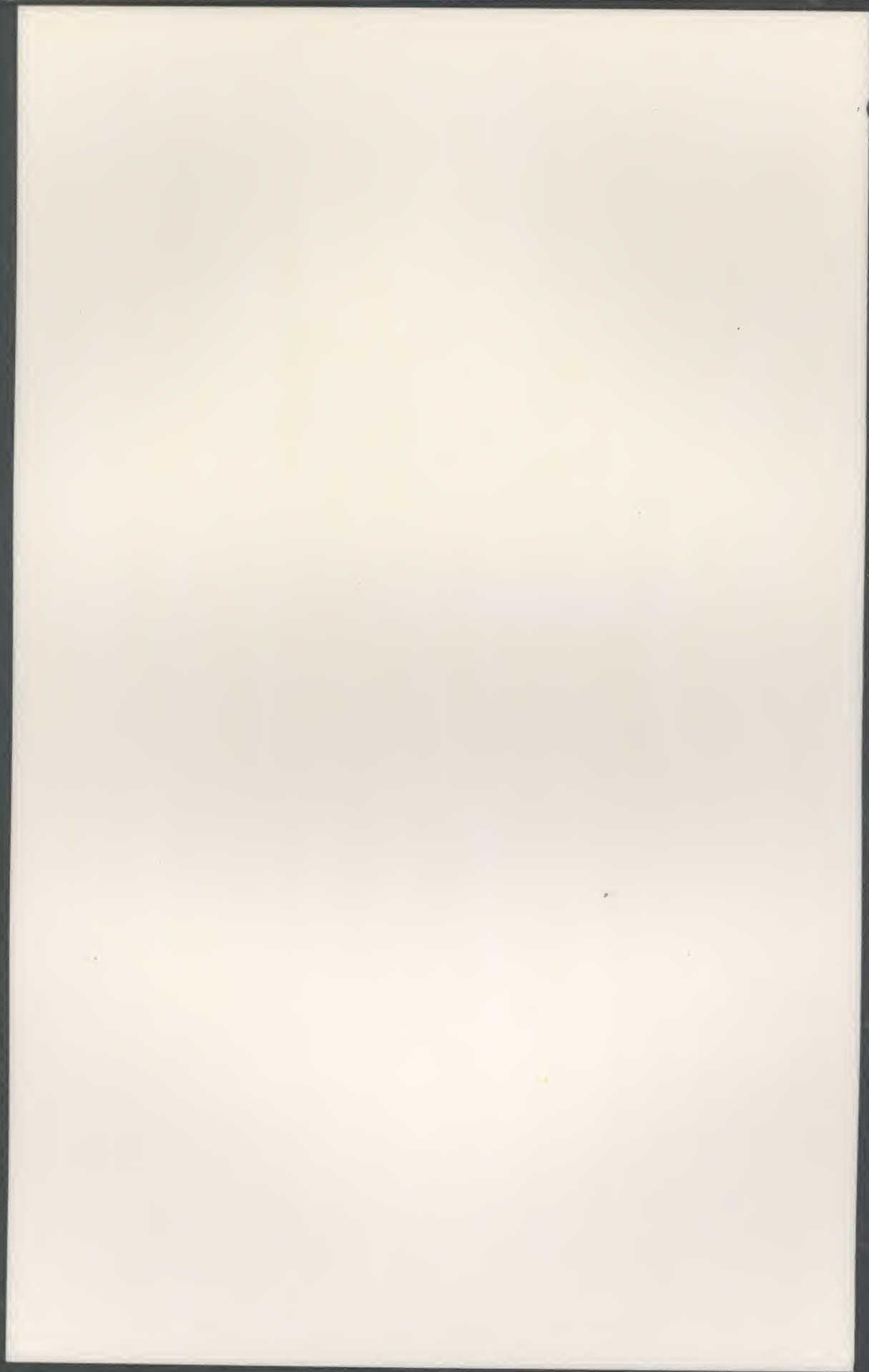


Fig. 2. The pneumothorax on the right side involves the entire upper chest. On the left side there is about a third compression of the entire lung by air.

It may be that during anesthesia an adhesion between the visceral and parietal pleura was torn loose, with a resultant bronchial fistula which allowed the escape of air into the chest cavity and into the tissues. We also considered the possibility of the presence of a foreign body, but this was excluded. There could have been a tracheal injury from a suction tip.

In any event, the complication was self-limiting and, although embarrassing for a time, the patient experienced no great difficulty and at the present time is well. Late x-rays of the chest are entirely negative.





# Chronic Intussusception in the Gastro-Intestinal Tract\*

## A Report of Thirty-Nine Cases

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WE HAVE reviewed, recently, a series of thirty-one cases of acute intussusception at The Mayo Clinic. In general, the review corroborated facts that had been gleaned in previous studies of the subject. Our primary object in making these studies is to find some means of improving methods of caring for patients suffering from intussusception, either acute or chronic.

In distinguishing between the acute and chronic forms of intussusception certain facts are outstanding. Approximately 80 per cent of the acute intussusceptions occur among children aged less than two years, whereas the youngest patient in our series with chronic intussusception was aged ten years, and most of them were in the fourth and fifth decades. Moreover, a pathologic cause is rarely found for acute intussusception of childhood, while the opposite is true of the chronic types. Naturally, too, there is a marked difference in severity of symptoms.

We shall not consider here a subacute form of intussusception. It is obvious that if the subdivisions of the acute and chronic forms are recognized a subacute condition may also exist, but for the purpose of our study it is not significant, since, so far as the patient is concerned, intussusception is with rare exceptions a surgical condition and the choice of surgical procedure needs no finer distinction than the divisions of acute and chronic intussusception.

Chronic intussusception, like acute intussusception, may occur in any part of the gastro-intestinal tract, although the most likely points are in the more mobile portions of the bowel, namely, the small bowel, cecum, transverse colon and sigmoid colon.

In our study of these thirty-nine cases of chronic intussusception, the term chronic is applied to cases in which symptoms of intussuscep-

tion had existed for several days to as long as two or three years. In the cases in which tumors are presented as the exciting cause, it is frequently difficult to interpret the exact duration of the intussusception.

There was a wide variation in the age of the patients; the youngest was aged ten years and the oldest sixty-nine. As stated, the largest number were in the fourth and fifth decades of life. Thirty of the patients were males and nine were females; a ratio of three to one, as compared to two to one in the acute form.

Symptoms depend on the degree of obstruction, the site of the intussusception, the pathologic cause, and the duration of the pathologic cause per se. Usually low grade or partial obstruction is present but obviously this may progress to the point of acute obstruction, manifesting an acute exacerbation of a chronic condition. Patients often exhibit amazing tolerance to extensive intestinal lesions of long duration. It may be said also that the intestinal tract exhibits amazing ability to restrain symptoms in the presence of marked obstruction.

In our consideration of these cases we have divided them into groups, depending on the situation of the intussusception, as follows: stomach, small bowel, ileocecal coil, appendix, transverse colon, and sigmoid colon.

### STOMACH

Several cases have been reported in the literature in which chronic intussusception followed gastro-enterostomy. We have not observed such a condition. The proximal loop of bowel in these cases has intussuscepted or prolapsed through the artificial stoma into the stomach proper. Operation has been necessary in order to accomplish reduction and fixation, or section, depending on the individual case. Shearer and Pickford, in 1928, noted reports of twenty-four such cases in the literature.

\*From the Division of Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Minnesota Surgical Society, Rochester, Minnesota, May 22, 1933.



### SMALL BOWEL

There were eleven cases of chronic intussusception in the small bowel. The cause in one case was indefinite, and in one it was the result of Meckel's diverticulum. In nine cases it was the result of tumors of the small bowel; three of these nine tumors were sarcomas, two were carcinomas, two were nonmalignant polyps, one was a fibromyxoma, and one a lipoma.

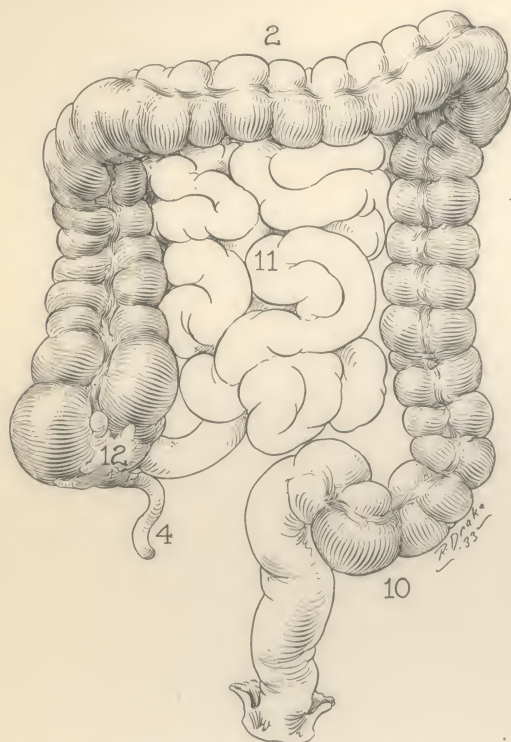


Fig. 1. Distribution of thirty-nine cases of chronic intussusception in the intestinal tract; the figures represent the number of cases occurring at the various points.

Intussusception is a possible complication in the presence of any tumor of the small bowel. The two chief factors in the syndrome of carcinoma in this organ are intermittent obstruction with shorter intervals of relief, and the presence of secondary anemia which not infrequently may be wrongly diagnosed pernicious anemia.<sup>2</sup> A movable tumor may be felt, depending on the size of the mass and the obesity of the abdominal wall. The pain is usually on the left side, but variable as to exact situation.

An attempt to reach a too exact diagnosis by the use of the stasis ray may complicate partial obstruction by creating an acute condition for which enterostomy alone must precede further operative procedures; at least, there is the possi-

bility of unwarranted surgical delay while the bowel is being cleaned out medically.

Surgical resection was done in eight of the eleven cases and reduction of the intussusception in three. In one of these, following reduction, the bowel was opened and a lipoma removed, the incision was closed in the opposite direction. Four of the patients died, a mortality rate of 36 per cent.

Resection is preferred in most cases of this nature because the underlying pathologic condition is so often malignant. The type of reanastomosis, whether end-to-end, side-to-side, or end-to-side, is a matter of choice on the part of the surgeon. The mortality rate is high but, on the other hand, the condition usually is serious.

### ILEOCECAL COIL

There were twelve cases of chronic intussusception of the ileocecal coil. In seven cases the condition was caused by carcinoma, and in five the causative agent was questionable. Of the seven cases of carcinoma, resection was done in six and ileocolostomy in one, with no surgical deaths. However, the patient who underwent ileocolostomy died at his home three months after the operation, so that the planned resection could not be carried out. Resection in this area was accompanied by a side-to-side or end-to-side ileocolostomy. In four cases the intussusception had progressed to or into the transverse colon. Of the five cases, resection was done in four, and reduction of the intussusception in one case. Two of the patients who had resections died. The surgical mortality rate in this group was 16.6 per cent.

### APPENDIX

Intussusception of the vermiform appendix is a relatively rare condition. Four of our cases were sufficiently marked to be included in this series. In one case the intussusception was complete, so the tip of the appendix was felt within the cecum. In one case, three-fourths of the appendix, and in one case three-fifths of the appendix had regressed into the cecum. In the fourth case, the condition was discovered accidentally during operation for disease of the gall-bladder, and was evidently secondary to tuberculosis of the cecum and ascending colon, for which resection of 7.5 cm. of ileum, cecum and ascending colon, was done with end-to-end anastomosis.

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22. Carcinoma of the cecum with a familial history of carcinoma. Report of a case. Proc. Staff Meet. Mayo Clinic 9:273-275 (May 9, 1934 with Dr. E.S.Judd.)
23. La curabilidad del cancer del labio. Bol. liga Contra Cancer. 9:154-158 (May) 1934



When intussusception of the appendix occurs it may act as a polyp, and although this is open to argument, we believe that it may be the primary cause in at least some of the unexplained cases of ileocecal intussusception. There were no deaths in this group of cases.

#### TRANSVERSE COLON

Two cases were included in this group; both were due to carcinoma. One patient died following operation. The other was operated on early in 1919 and was well in 1926; this operation consisted of resection with end-to-end anastomosis, and appendicostomy for a safety valve.

#### SIGMOID COLON

There were ten cases of chronic intussusception of the sigmoid, eight of which were due to carcinoma, one to lymphosarcoma, and one to lipoma. Such intussusception may be extensive enough to be palpated by a finger in the rectum. A high growth may descend to a point at which it can be reached by the proctoscope and a specimen removed for diagnosis. It is possible, too, for the growth to protrude from the rectum. The case of lymphosarcoma had been reported recently by Dixon.

Resection invariably was the operative procedure. Preliminary colostomy was done in several cases, and primary resection with end-to-end anastomosis in others. The method of dealing with each case varied, depending on the case and the judgment of the surgeon. Three of the patients died, giving a surgical mortality rate of 30 per cent.

#### SUMMARY

The treatment for chronic intussusception is surgical, and the aim of treatment should be the primary or eventual removal of the causative agent. This is important since the agent is of a malignant nature in a large percentage of cases (56.5).

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A NEW METHOD OF IMPROVING THE CONDITION OF THE ABDOMINAL WALL PRELIMINARY TO CLOSURE OF INTESTINAL FISTULAS; INDEPENDENT CARCINOMA OF THE COLON OCCURRING SIX YEARS AFTER CARCINOMA OF THE STOMACH; THE TREATMENT OF PHARYNGO-ESOPHAGEAL DIVERTICULA IN THE AGED; SURGICAL PROCEDURES THAT SOLVE OUTSTANDING PROBLEMS IN CASES OF ULCER OF THE STOMACH AND OF THE DUODENUM; DIVERTICULITIS; FOREIGN BODY IN THE STOMACH

E. STARR JUDD AND J. ROBERTS PHILLIPS

A NEW METHOD OF IMPROVING THE CONDITION OF THE ABDOMINAL WALL PRELIMINARY TO CLOSURE OF INTESTINAL FISTULAS

The symptoms resulting from the presence of external intestinal fistulas depend largely on the proximity of the opening in the intestine to the pyloric sphincter. If the fistula originates in the small intestine, there is loss of gastro-intestinal secretions, usually resulting in considerable dehydration and emaciation. The secretions attack the tissues of the abdominal wall and erode them, causing additional discomfort and annoyance. Although the problem is more serious if the opening is high in the intestinal tract, nevertheless these conditions obtain to some degree even when the opening is in the terminal part of the small bowel.

We recently observed a case in which a gastric fistula developed six days after an exploratory operation, although a drain had not been used during the procedure. The patient



had an inoperable carcinoma of the stomach. Difficulty with the line of suture practically never occurs following excision of the duodenal cap and the anterior part of the pyloric sphincter, when closure is by gastroduodenostomy in cases of duodenal ulcer. This good result apparently is because of the preservation of the blood supply from the posterior wall of the duodenum. Following resection of the stomach, healing of the duodenal stump may be slow and insecure, evidently due to the poor blood supply to this region. The liability of leakage from the duodenal stump after resection is the vulnerable feature in that operation.

Sometimes duodenal fistulas occur after operative procedures on adjoining structures, such as the gallbladder, stomach, or right kidney, especially if the disease of these organs has been extensive. Much care should be exercised in resecting the right half of the colon, or the retroperitoneal portion of the duodenum may be injured and a fistula ensue. Or, if part of the duodenal wall has to be removed because of attachment to a malignant growth in the ascending colon, accurate closure is sometimes difficult and a fistula results.

Probably the most common fistula of the small bowel is that which follows rupture of the appendix. The cecum and adjacent part of the small intestine may be so intimately involved in the necrotic mass that a fistula inevitably develops. Certain methods of disposing of the appendiceal stump following appendectomy have been thought to offer additional protection against the formation of fistulas. Some surgeons advocate purse-string inversion of the stump, and others believe that the stump should be ligated, carbolized and dropped back. The possibility of the presence of tuberculosis or of actinomycosis must also be considered. Or the problem may be even more serious, as is illustrated by the experience with a patient recently seen: a woman, nineteen years of age, came for consultation because of an annoying fistula that had occurred following appendectomy. Curettement of the fistulous tract revealed the presence of colloid carcinoma. Ileocolostomy had to be performed; resection of the involved segment

of intestine will be necessary later. A tuberculous lesion may necessitate a similar procedure. The presence of a foreign body in the intestinal tract may be responsible for the fistula. An artificial fistula from the terminal part of the small bowel is sometimes temporarily necessary, but usually the fistula heals spontaneously after serving its purpose.

Fistulas from the sigmoid are almost always the result of perforation of a diverticulum, although some are secondary to difficult pelvic operations in which the colon had to be freed from the inflammatory or tumorous mass. If tuberculous disease in the adnexa is responsible for the condition, that process must be removed as completely as possible before relief can justly be anticipated. Even with this accomplished, and the opening in the bowel repaired, a sinus will sometimes persist. Closure of an opening in the large bowel is usually difficult, and is attended by considerable risk on account of the infection that is always present.

The fistulas which originate in the gastro-intestinal tract present numerous and varied problems; they often tax the patience and skill of those who have wide experience in the handling of the condition. The only logical way to approach the problem is to determine the cause of the condition just as accurately as possible, before any attempt is made to effect closure of the opening in the intestine. The presence of a foreign body in the intestine, of obstruction, of communications between adjacent loops, or of prolapse of the wall of the intestine through the peritoneum may be responsible for failure of the fistula to close spontaneously, providing tuberculosis, malignancy, or actinomycosis is not present. A small duodenal fistula usually will close promptly following conservative measures. The presence of a large opening in the upper part of the intestinal tract will require prompt surgical intervention in order to minimize dehydration, emaciation, and so forth.

Many methods have been used to encourage these intestinal fistulas to heal, and to prepare the abdominal wall for surgical intervention. All of these procedures embrace some method



of improving the condition of the abdominal wall by relieving the irritation that results from contact with the intestinal material that drains forth. Of these, suction perhaps gave the best results until a very simple measure was suggested. This consists of plugging the external fistulous opening with a large piece of ordinary chewing gum, which the patient previously has chewed to the requisite softness. If blockage of the external exit does not produce symptoms referable to obstruction in the intestinal tract, we know that this need not be considered. The method has been tried in several cases, with good results. The condition of the skin improves rapidly. If surgical intervention is imperative, it can be undertaken more promptly than usual, and with the skin in good condition. Occasionally it has been feasible to permit the patient to return home with the opening plugged with gum, and to have him wait an ample period to determine whether the fistula will heal without surgical intervention. This plan of using chewing gum was proposed by the late Donald Macrae, Jr., of Council Bluffs, Iowa. We have used gum in this way in many instances since then, and two cases are reported for illustrative purposes:

**Case I.**—A man, forty-four years of age, related that he had undergone operation two and a half years previously, for acute appendicitis, with rupture of the appendix. Three days after drainage of the abscess that was present in the lower right quadrant of the abdomen, ileostomy had been performed for ileus. Emergency colostomy had been performed the same day; multiple enteric fistulas had resulted. After the patient had been in hospital for ten weeks he had been transferred to another institution and Dr. Macrae had been consulted. He had suggested the use of chewing gum to plug the fistulous exits. About two years later the patient consulted us because he had grown tired of the necessity of changing the gum frequently. The abdominal wound was clean and in good condition, and he was not having any pain.

The fistulas were closed April 10, 1933. There was a communication between a loop of the upper part of the ileum or of the jejunum, and the terminal part of the ileum, and there was a sinus tract leading through the abdominal wall. The intestinal loops were separated, and the openings were closed transversely. At the end of the repair it was demonstrated that the intestinal lumen was adequate. The exploratory wound was closed tightly, in the usual manner, with silkworm sutures. A small drain was inserted in the original sinus opening in the right inguinal region, and four interrupted, through-and-through, silkworm sutures, were inserted to approximate the skin. Healing was complete and firm at the end of thirty days.

**Case II.**—A student, twenty-two years of age, related that he had had an attack of severe abdominal pain in January, 1933. After two days the pain had localized in the right lower quadrant of the abdomen and operation for appendicitis had been performed. It had been found that the appendix was ruptured. The postoperative course had been stormy. The presence of general peritonitis was evident. Signs and symptoms of intestinal obstruction had developed. Finally, when exploration of the abdomen had been undertaken, a loop of small bowel had been found to be gangrenous. Twelve inches (30 cm.) of gangrenous bowel had been removed. Five days after the resection, the patient's abdomen again had become distended, and he had experienced acute pain in the lower part of the abdomen. Enterostomy had been performed. The distention had subsided, but an abdominal fistula had developed and feces had ceased to pass by rectum. A third operation had been undertaken March 5, with the object of freeing another loop of intestine that had been thought to be obstructed at the time of the previous exploration. At the third operation the patient had gone into a condition of shock and it had been necessary to close the abdomen hurriedly, without accomplishing the purpose of the operation. Intestinal content had continued to discharge to the outside from the enteric stoma and the patient had had a great deal of pain and discomfort from irritation of the abdominal wall.

We learned the foregoing facts when the patient came to us for consultation early in June with regard to multiple fecal fistulas. Treatment by suction and the use of chewing gum to plug the openings was begun in preparation for the operation.

A low, right rectus incision was made through the old scar. Three loops of the small intestine were caught together, in two of which there were large, fistulous openings. The loops of intestine were carefully freed from each other and the two openings were closed by suture. Then the small opening in the cecum was repaired. The operative wound was completely healed and the patient was in good condition when dismissed from our care on the twenty-sixth postoperative day.

#### INDEPENDENT CARCINOMA OF THE COLON OCCURRING SIX YEARS AFTER CARCINOMA OF THE STOMACH

Experience has demonstrated that carcinoma is a curable disease. The appearance of a second primary growth, or even of multiple malignant growths, does not necessarily signify that the situation is hopeless. The literature is replete with reports of cases that support these contentions. However, it will do no harm to report one of these cases to call attention again to the excellent results that may be obtained by careful attention to detail in carrying out present plans of treatment, for what is needed, in many instances, is courage to persist in the measures that have proved adequate in control of



the disease. We do not claim final cure in this case, but we do claim probable cure of one carcinoma and at least adequate palliative results of treatment of a second one.

**Case III.**—A salesman, fifty-six years of age, first came for consultation early in March, 1927. At intervals he had had attacks of digestive disturbance, consisting of pain arising two or three hours after eating, and relieved by the taking of food or alkalies. These attacks would last six weeks to two months. A Sippy regimen had given some relief. Roentgenologic examination of the stomach, made elsewhere, in June, 1926, had revealed the presence of an ulcer on the lesser curvature.

When we first saw the patient, in 1927, he seemed to be in good general condition. Analysis of gastric content after a test meal gave a value for free hydrochloric acid of 30 and for total acids of 30. Roentgenologic investigation of his stomach gave evidence of a perforated lesion, high on the lesser curvature. The roentgenographic appearance of the lesion, the duration of the symptoms, and the fact that the lesion had perforated, all seemed to support a diagnosis of benign ulcer. However, the size of the crater, and the failure of the condition to respond to treatment, suggested the presence of malignancy. The perforation might have accounted for this. March 26, the lesion was widely excised and posterior gastro-enterostomy was performed. It proved to be a carcinomatous ulcer 1.5 by 1 cm. in diameter. In its base there were two small orifices, caused by erosion of blood vessels. The lesion was a carcinoma of grade 1. Recovery was uninterrupted, and the patient left the hospital on the fourteenth postoperative day.

The anastomosis functioned satisfactorily and the man felt well until May 8, 1933. At this time he noticed some rectal bleeding. He returned for further examination, May 22. Investigation revealed the presence of a carcinoma of the rectum. May 26, posterior segmental resection of the rectum was carried out, preserving the rectal sphincter. The bowel was reunited by end-to-end anastomosis. The lesion in the rectum was a shallow adenocarcinoma of grade 2, 3 cm. in diameter, situated 10 cm. above the anus. The adjacent lymph nodes had become involved.

The postoperative course was satisfactory. There was fecal drainage through the posterior wound for a time but this gradually subsided. A small sinus was still present when the patient was dismissed from our care six weeks after the operation. At this time, he had good control of the rectal sphincter and feces were passing normally through the rectum.

Several interesting features are brought out by this case; it illustrates how difficult it is to make an accurate clinical differential diagnosis. Often it is impossible to be sure whether a lesion is benign or malignant until it is removed and examined microscopically. The only safe way is to remove it and study the structure of the growth under the microscope.

Perforation of a lesion is not an assurance that it is benign, as was formerly thought. Furthermore, a benign but extensive lesion may bear such marked resemblance to carcinoma that it will be mistaken for an inoperable growth. This is particularly true of large ulcerating lesions. A physician is somewhat embarrassed when such a patient returns months or years later in an improved condition. We recently had an opportunity to examine a man who had had this experience. He had submitted to an exploratory operation eighteen months previously. At that time a lesion high on the lesser curvature of his stomach had been thought to be an inoperable carcinoma. A specimen of this tissue had not been removed for microscopic study. In the six months before we saw him he had gained in weight and felt much improved, which seems to indicate that an error in diagnosis had been made.

A review of the more recent literature confirms our experience that it is not unusual to have patients with carcinoma of the stomach live out their normal expectancy following adequate surgical treatment of the condition. In the case of multiple primary malignancy reported here, more than six and a half years have elapsed since wide removal of the carcinoma of the stomach. In a study made a short time ago, four cases were taken at random for illustrative purposes. It was found that these patients had lived nine, twelve, twelve and nineteen and a half years, respectively and that they were sixty-five, sixty-seven, seventy-two and eighty-seven years of age at the time of the last report. Balfour found in the files of the clinic the records of 128 patients, all of whom were living and well more than ten years after operation for carcinoma of the stomach.

In 1869 Billroth reported a case in which he had found multiple primary malignant neoplasms. He was probably the first to record such a case in the literature. Goetze formulated criteria which seemed pertinent for establishment of the diagnosis of multiple primary malignant growths. In substance, he stated that the tumors must have the macroscopic and microscopic appearance of the usual tumors of the organs in-



volved; the possibility of metastatic origin must be excluded, and the diagnosis must be confirmed by the character of the individual metastatic growth. Hanlon carefully reviewed the literature and reported finding forty-eight additional reports of cases of multiple primary malignant growth. Williams has said that multiple outbreaks of malignant disease are probably less exceptional than is generally believed. He felt that the frequency with which these lesions occurred in impaired organs was direct evidence of this. In conclusion, he said, "taken in their entirety, these various considerations point to some general systemic change as the predisposing cause of multiplicity." Experience seems to indicate that when a second primary malignant growth occurs it is most often in an organ of the same system as that of the original lesion. When Moench studied 403 cases of ovarian malignancy, she found the condition to be bilateral in 24.8 per cent. In Harrington's series of 3,038 cases of carcinoma of the breast, there were twenty in which the condition was bilateral and in which he felt that it was primary in each breast. In forty-two other cases, carcinoma developed subsequently in the opposite breast. Not infrequently the colon is the site of two or more primary growths, especially if the original condition is polyposis. Hurt and Broders studied a large series of cases, and found the incidence of multiple primary malignancy to be 3.3 per cent, and also presented evidence to show that the incidence was even higher than that.

In some instances the situation of a rectal growth will be such that it can be completely removed and still preserve the rectal sphincter, just as was possible in the case which we have presented here in detail.

#### THE TREATMENT OF PHARYNGO-ESOPHAGEAL DIVERTICULA IN THE AGED

Von Bergmann in 1892 reported the first successful extirpation of a diverticular sac arising from the esophagus. Apparently the diverticulum was in the usual situation, at the weak point in the posterior wall of the lower end of the pharynx,

on a line with the cricoid cartilage. These herniations of the mucosa and submucosa really should be called pharyngo-esophageal pulsion diverticula, for they differ from the traction diverticula which contain all layers of the wall of the pharynx, including the muscular layer. As the pulsion diverticulum increases in size, it gravitates along the vertebrae, downward toward the thorax. The larger the sac, the more annoying it is likely to be, although a small diverticulum sometimes will cause a great deal of disturbance. Some of these diverticula are as much as 9 cm. long. For some reason, large pharyngo-esophageal diverticula are seldom found among women; furthermore, statistical studies suggest that the condition is about four times more prevalent among men than among women.

Most patients who have pharyngo-esophageal diverticula come for consultation when they are between the ages of fifty and sixty years. The history usually suggests that the diverticulum has been present a long time, and that meanwhile it has increased in size, causing more and more difficulty in swallowing, and resulting in emaciation and dehydration. As a result of these factors, those needing treatment for this condition are likely to be elderly and in a poor state of general health for the necessary surgical intervention. The three cases, of which reports follow, illustrate some of the problems involved, and indicate how carefully physicians must proceed.

**Case IV.**—A man, seventy years of age, had had difficulty with swallowing for twenty years, and for two years had noticed epigastric distress at intervals. One week previous to his examination he had had a severe attack of epigastric distress which had doubled him up; this had come on after a hearty meal. There was no radiation of pain; gradually he had obtained relief by belching. Examination revealed that his blood pressure was 120 mm. of mercury systolic, and 78 diastolic. Analyses of urine and blood gave negative results. Roentgenologic investigations of the stomach, colon, and thorax were made in an effort to discover a cause for the pain in the upper part of the abdomen. Electrocardiographic study failed to reveal any abnormality. Roentgenologic examination of the esophagus disclosed the presence of a large diverticulum; there was no obstruction distal to the sac.

July 10, 1933, the sac was dissected out of the tissues of the neck, and brought up and fixed in the superficial structures. One week later the diverticulum was excised, and the stump ligated and dropped back. Nineteen days later the man was dismissed from hospital. Three days after this he returned



home. The incision in the neck had healed, and he was swallowing satisfactorily. September 9, 1933, he reported that he had gained in weight and was feeling well again.

**Case V.**—A farmer, seventy-six years of age, complained of loss of weight, inability to swallow, and weakness. Although two examinations in the clinic, respectively ten and six years before, had revealed that he had a pharyngo-esophageal diverticulum, apparently he was not having much difficulty. Recently the symptoms had increased, and the disturbance in swallowing had prohibited him from getting a normal amount of nourishment. Six months before his third visit, he had had an attack of pain in the right upper abdominal quadrant, which had been projected to his shoulder. According to his recollection, there had been some residual soreness over the gallbladder. Examination revealed that his blood pressure was 136 mm. of mercury systolic, and 90 diastolic. Electrocardiographic studies gave evidence of myocardial degeneration, with coronary sclerosis. Roentgenologic examination of the esophagus disclosed the presence of a large, pharyngo-esophageal diverticulum. A diagnosis of cholecystitis with stones also was made.

The patient was in poor condition for any operation, regardless of the coronary disease, for he was not able to take sufficient nourishment to maintain himself. For a week previous to surgical treatment, he was given preliminary preparation. This consisted in feedings at intervals by nasal tube, and intravenous administration of fluids. August 11, 1933, the first stage of the operation was carried out under cervical block anesthesia. The sac was freed and was brought up and fixed in the superficial structures of the neck. The man was allowed to be up and about the room the following day. August 18 the sac was removed.

Convalescence was uneventful and the patient was dismissed from hospital eighteen days after the first stage of the operation had been undertaken. He left for home two days later. The wound in the neck was healed. He was able to swallow normally, had already begun to gain in weight, and stated that he was feeling well.

**Case VI.**—A man, seventy-one years of age, came for consultation because he had had difficulty in swallowing for several years. Recently the annoyance had increased and there had been more regurgitation of food than before. He had found that pressure over the right side of his neck would cause ejection of particles of food and would relieve the sensation of pressure in the throat. Examination revealed that his blood pressure was 148 mm. of mercury systolic, and 88 diastolic. Analyses of urine and blood failed to reveal any abnormality. There were 20 c.c. of residual urine in the bladder. On test of renal function, 85 per cent of intravenously injected phenolsulphonphthalein was returned in two hours. There was moderate hypertrophy of the prostate gland. Roentgenologic investigation revealed a large diverticulum of the upper third of the esophagus, in the usual position.

July 10, 1933, the sac was dissected out of its bed in the neck and was lifted up and fixed in the superficial tissues of the neck. Ten days later, the sac was excised and the stump ligated and dropped back into the muscular

structure of the neck. After the first stage of the operation, some huskiness of the voice was noticed. The vocal cords were in position in the median line. At no time was there any interference with breathing, and the man was able to be up the day following operation. He remained in the hospital seventeen days. Five days later he returned home. The wound in the neck had healed. There was motion of the vocal cords although it was limited, and the aperture was smaller than normal. August 17, 1933, he reported that his voice was normal and that he was eating with more comfort and with a greater feeling of security than he had enjoyed in several years.

An operation in two stages under cervical block anesthesia, minimizes the risk. An incision about 4 inches (10 cm.) long, is made anterior to, but parallel with, the left sternomastoid muscle. The dissection is then carried down to the omohyoid muscle, which is divided. The carotid sheath is retracted laterally and the thyroid gland medially. If necessary, the middle thyroid vessels may be divided to obtain better exposure. It is best not to divide the thyroid artery, for that may interfere with the blood supply to this particular part of the esophagus, which already has a poor blood supply and is likely to heal slowly.

The diverticular sac usually can be identified without much difficulty, for it is prone to be of lighter color than the other tissues, and ordinarily there is a small plexus of veins over it. The sac is freed down to its neck; then it is lifted up and brought out through the upper angle of the incision. If the sac is small, disposing of it in this way may cause undue tension. Under the circumstances, it is better to elevate the sac as much as feasible, and to stitch its neck to the adjoining muscles; a silk thread placed through its fundus but not into the lumen of the sac is brought to the outside as an aid in identifying the sac at a later stage of the operation, when the tissues all look much alike because of edema.

The lapse of a week to ten days between the two stages of the operation permits the former site of the diverticulum to be walled off, and this lessens the danger from cellulitis and mediastinitis. Since the sensory nerves are divided at the first operation, only very light anesthesia is required for the second stage. At this time, the sac is freed and removed, the stump



being ligated and dropped back. A drain is inserted down to the stump, and the superficial tissues of the neck are closed loosely around the drain. In a few instances, slight leakage from the stump will occur, but usually the area heals promptly.

The thread swallowed by the patient and used as a guide during the preoperative esophagoscopic examination is still in situ, so that it can serve a similar purpose in inserting a stomach tube. This tube is left in for five to seven days after the second stage. Since the patient receives his nourishment through the tube, the muscular effort incident to swallowing is minimized and there is very little, if any, tension on the esophagus. Should the patient experience any difficulty in swallowing after removal of the tube, a thread may be used as a guide in carrying out the dilatations; however, dilatation of the esophagus postoperatively is rarely necessary.

The patient is allowed to get up for brief periods on the day of the operation, he sits up the next day, and usually walks about the hospital at will on the third day. With this plan, elderly patients avoid having difficulty with the urinary tract, and postoperative complications are minimized. The three elderly men whose cases are reported all made prompt recovery from this operation in two stages.

#### SURGICAL PROCEDURES THAT SOLVE OUTSTANDING PROBLEMS IN CASES OF ULCER OF THE STOMACH AND OF THE DUODENUM

In any consideration of gastric ulcer, the possibility of the presence of malignancy must be kept in mind. This makes removal of the lesion imperative unless there are definite contraindications. The incidence of carcinoma in the duodenum is practically nil, and so an entirely different approach can be made to the problem of duodenal ulcer. It is certain that in some instances duodenal ulcer heals spontaneously, and that a carefully regulated medical and dietary regimen may expedite resolution of the process. However, it is also true that there are certain types of persons, particularly those of nervous temperament, who find it difficult to adapt themselves to a regimen,

and for the same inherent reason surgical treatment is likely to be disappointing. Even if the ulcer is made to heal, it is not unusual for the condition to recur. Of course, there are other circumstances under which surgical intervention will not be advisable. Fortunately, increasing experience makes it possible to recognize most of the cases in which, eventually, surgical treatment will be demanded.

The chronicity of the course of duodenal ulcer is one of the principal justifications for early surgical intervention. However, if it were not for the fact that the risk of operating is low during this stage of the disease, the decision to operate would not be justified, for it must be remembered that in some instances the procedure will be undertaken for relief of symptoms that are more annoying than disabling. If the operation is carried out before there is much fixation, contracture, pouching, or narrowing of the duodenum, the most satisfactory form of treatment can be applied, and it can be carried out readily. Although removal of the lesion is usually preferable, particularly in treatment of young persons, ordinarily one is not justified in assuming the risk incident to extirpation of an ulcer that has caused rather marked fixation of the duodenum. Often it will be found preferable to carry out a short-circuiting operation. When it has been decided that an ulcer in the upper part of the gastro-intestinal tract demands surgical attention, the next step is to determine the type of procedure that will offer the patient the best chance of relief, and to estimate the degree of risk that will be involved.

A group of cases has been selected to illustrate methods of solving some of the more difficult problems that may be encountered. In Case VII, the operation was excision of a gastric ulcer and gastro-enterostomy; in Case VIII, segmental resection of the stomach; in Case IX, partial gastrectomy with posterior Polya type of anastomosis; in Case X, excision of the duodenal cap and of the anterior two-thirds of the pyloric sphincter; in Case XI, gastroduodenostomy; and in Case XII, gastro-enterostomy.



**Case VII.**—A laborer, fifty-two years of age, had had pain in the epigastrium for six months, and in this time had lost 20 pounds (9 kg.). The distress did not seem to be related to the intake of nourishment.

The patient's blood pressure was 120 mm. of mercury systolic, and 72 diastolic. Analysis of gastric content after a test meal revealed free hydrochloric acid of 24 and combined acids of 34. There were no remnants of food nor blood in the gastric content. The value for hemoglobin was 72 per cent. Roentgenographic examination of the gallbladder revealed no sign of abnormality; that of the stomach disclosed the presence of perforating ulcer high on the lesser curvature. A comparatively brief period of symptoms, with coincident marked loss of weight, in association with a lesion of the stomach, justified the suspicion that malignant change might have taken place.

At operation, August 18, 1933,<sup>a</sup> a left rectus incision was made for exploration of the stomach. The lesion was high on the lesser curvature and posterior wall of the stomach, close to the cardia, and had perforated onto the pancreas. After the ulcer had been freed from the pancreas by careful dissection, wide excision of the lesion was made. The opening in the wall of the stomach was closed, and posterior gastro-enterostomy was performed. The pathologists reported that there was much inflammation in the tissues surrounding the ulcer, but that there was no evidence of malignant change. Immediate convalescence was uneventful, and the man was dismissed from hospital on the fourteenth postoperative day.

Although the syndrome, and the results of clinical investigations may be identical with those which are usually associated with a benign lesion of the stomach, nevertheless, it is impossible to be absolutely certain that such a diagnosis is correct until it is sustained by study of the tissue under the microscope. However, when lesions are near the cardia, all procedures except gastro-enterostomy may be contraindicated. If a simple ulcer is present, striking results may be obtained following this operation, for it permits the inflammatory process to subside, and the ulcerated area may completely heal over. In the case cited, it was possible to excise the lesion without unwarranted risk, although it was situated high on the lesser curvature. This certainly obviated the necessity of a prolonged period of medical and dietary care to assist in resolution of the inflammatory process. With the nature of the lesion definitely determined, the patient's peace of mind was restored. Both of these features are material to prompt recovery.

If an ulcer involves the middle portion of the stomach, resection of the body of the stomach, or segmental resection,

usually can be carried out readily and satisfactorily. Accurate suture of the remaining parts of the stomach is not difficult ordinarily, and if the tissues are healthy, healing is prompt. The same procedure can be utilized for malignant lesions. If the patients are elderly, there is usually more uncertainty concerning the nature of the process, and accurate clinical diagnosis is difficult to make.

Furthermore, the infection associated with peptic ulcer is undoubtedly a factor in the pulmonary complications that are prone to follow surgical treatment of the condition. Experience indicates that the use of oxygen, postoperatively, may be of great benefit in reducing the incidence of inflammatory processes in the thorax. With bronchiectasis and extensive bronchitis already present, the hazard of any surgical treatment would be materially increased.

**Case VIII.**—A letter-carrier, fifty-three years of age, had had difficulty with his stomach for seventeen years. The difficulty consisted of belching of gas, a feeling of fullness after eating, and attacks of peristaltic pain. In 1926, he had undergone cholecystectomy, appendectomy, herniotomy, and tonsillectomy. After these procedures he was free from dyspepsia. Six weeks before he came for consultation he had begun to have distress across the epigastrium three or four hours after eating. He had been examined and told that he had a gastric ulcer. Weakness and emaciation had been progressive in the past six weeks, and he had lost 35 pounds (16 kg.).

At the time of the examination the man was expectorating profusely, and evidently had bronchitis. Examination of his thorax failed to reveal the presence of any tuberculous process, but severe bronchitis and bronchiectasis were present. Roentgenologic investigation of his gastro-intestinal tract revealed the presence of an ulcer on the lesser curvature, well above the angle of the stomach. The brief history of symptoms, the marked loss of weight and the size of the lesion, led to the suspicion that the lesion might be malignant. It was realized that the risk of operative procedure would be increased on account of the severity of the process in the thorax; however, the patient was willing to assume the risk.

December 19, 1932, segmental resection of the stomach was carried out. The ulcer had perforated and had become firmly attached to the anterior surface of the pancreas. In order not to increase the risk, the base of the ulcer was left in the pancreas in freeing the stomach. A small, split-tube drain was inserted down to this region of the pancreas. About a third of the stomach was removed. The patient was placed in an oxygen tent for the first twenty-four hours after operation, and was in the tent intermittently during the following day. His temperature did not rise above 100° F. Convalescence was entirely uneventful; the man was able to leave the hospital seventeen days



after operation, and went home five days later, with his wound healed and in good condition.

It is not unusual to find multiple ulcers in the stomach, or both a gastric and a duodenal ulcer may be present. One or both of the lesions may have perforated, causing marked fixation. If partial gastrectomy can be carried out without too great risk, it is likely to be the most satisfactory procedure, especially if the lesion is situated in the lower half of the stomach. The experience of one of our recent patients is typical of the result that may be obtained; in this case the disease was confined to the stomach and consisted in a single ulcer.

**Case IX.**—A farmer, forty-six years of age, had had distress after eating for the past five or six years. The attacks that occurred during the autumn and spring were particularly severe, and sometimes lasted two or three months. Sometimes there was rather severe pain across the right upper portion of the abdomen; on other occasions it was dull and constant. Frequently, it occurred before breakfast and was relieved by taking of food.

Analysis of gastric content after a test meal disclosed free hydrochloric acid of 26, with total acidity of 42. Roentgenologic examination of the stomach revealed an ulcerating lesion at about the middle of the lesser curvature. The function of the gallbladder was normal. Examination of the urinary tract failed to reveal any significant finding. The value for hemoglobin was estimated, and was found to be 91 per cent. The blood pressure was 140 mm. of mercury systolic, and 84 diastolic.

June 2, 1933, partial gastrectomy was performed. By this operation about half of the stomach was removed. The operation on the stomach was completed by a posterior Polya type of anastomosis. The pathologists reported that the lesion was a chronic, inflammatory, perforating gastric ulcer, 1.5 by 1 cm. in diameter. They saw no evidence of cellular change suggestive of malignancy.

The postoperative course was satisfactory, and the patient was dismissed on the seventeenth postoperative day, with his wound healed and in good condition.

Ulcer of the duodenum is more prevalent than ulcer of the stomach. From time to time attempts have been made to explain the presence of these lesions. The theory of infection is certainly one of the most tenable. Research has revealed that foci of infection may play an important part in production of the ulcer and in continuance of the lesion once it has formed. Spasm of the pyloric sphincter has been recognized as a formidable factor in causing the symptoms, and it may be an influence in the formation of the lesion.

It is therefore logical to think that the best chance of complete and permanent relief will be afforded by removal of the ulcer and ablation of the sphincter, together with reestablishment of normal continuity of the gastro-intestinal tract. Ninety per cent of the patients will obtain satisfactory relief following this operation, providing it is applied in cases to which it is adapted. Removal of the ulcer is particularly desirable in operating on young patients and on those who have experienced bleeding from the lesion.

The procedure consists in removing the duodenal cap with the ulcer, and two-thirds of the pyloric sphincter, making closure as a gastroduodenostomy. The duodenum may at first appear to be too fixed to carry out the operation with a reasonable degree of safety, but often it will be found that by freeing some of the attachments the intestine can be brought up sufficiently to utilize the procedure. In only about 50 per cent of the cases will it be possible to extirpate the duodenal ulcer without unwarranted risk. This operation permits inspection of the posterior wall of the duodenum. In many instances there will be an area of duodenitis or an ulcer on the posterior wall. If feasible, its removal can be included in the partial excision of the pyloric sphincter. Barring that, it can be extirpated separately, and the opening closed without seriously increasing the risk in some instances. A lesion which has not ulcerated may not require surgical attention. In most cases, it may be better to leave it undisturbed. However, knowledge of the presence of such a condition will be an important factor in deciding on the postoperative medical and dietary regimen. A case in point is cited.

**Case X.**—A man, thirty-eight years of age, came to the clinic stating that he had an ulcer of the duodenum. The ulcer had been discovered, elsewhere, at an operation for inflammatory disease of the appendix and gallbladder, which had been carried out in January, 1932. Temporary relief of the distress in the upper part of the abdomen had followed this cholecystectomy and appendectomy. A medical regimen had been tried, but the patient's difficulty had increased. For the last fifteen years he had had pain and distress in the left side of the abdomen, and in the region of the umbilicus, usually occurring several hours after eating, and sometimes accompanied by vomiting. The long history of the disturbance, its increasing severity in spite of careful dietary



and medical care, and the roentgenologic demonstration of the presence of an ulcer, amply supported the decision to adopt a more direct method of attack on the problem.

June 14, 1933, the lesion on the anterior wall of the duodenum was excised, together with the anterior two-thirds of the pyloric sphincter muscle; closure was made as a gastroduodenostomy. Inspection of the posterior wall of the duodenum revealed an area of duodenitis about 2 cm. in diameter. Definite ulceration was not demonstrated, and the area was not disturbed, as the procedure already carried out would be a material aid in resolution of the process.

The immediate convalescence was uneventful. Two months after the operation he wrote that he had gained 15 pounds (approximately 7 kg.).

There is still another procedure which preserves the normal continuity of the gastro-intestinal tract and which is adaptable to certain conditions, particularly those in which there is considerable scarring and contraction of the duodenum, and in addition rather marked fixation. If the duodenum can be mobilized sufficiently to allow the alimentary content to be shunted around the scarred portion, and gastroduodenostomy to be performed, this procedure will be preferable to gastroenterostomy, for it does not leave a mechanical arrangement conducive to the formation of jejunal ulcer.

The treatment of a jejunal ulcer is a surgical problem. In a case in which such a condition develops, from the beginning of the symptoms which attended the duodenal ulcer, through the time before another operation, the patient probably will be subjected to economic loss on account of disability. Two operations are necessary to accomplish that which might have been accomplished in the first place by gastroduodenostomy. This procedure was used to good advantage in the following case.

**Case XI.**—A man, fifty-four years of age, had had periodic distress in the epigastrium for twenty-three years. Shortly before we saw him, he had realized that the episodes of distress were likely to come at certain seasons of the year. In 1920, 1923 and 1926 he had had gastro-intestinal hemorrhages. For two years he had had attacks of vomiting of obstructive type.

His general appearance gave the impression that he was suffering from rather severe dehydration, and that he had lost weight. He stated that he had lost 30 pounds (approximately 13.5 kg.). Roentgenologic examination of his gastro-intestinal tract gave evidence of an obstructing ulcer just below the

pylorus, causing deformity of the duodenum and dilatation of the stomach. Hospitalization was deemed necessary from the time of his admission. Saline and glucose solutions were given intravenously for six days. When the gastric content was aspirated daily during this period, from 1500 to 1700 c.c. were obtained. The values for blood urea, plasma chloride, and carbon-dioxide combining power were all within normal limits. After the dehydration had been combated and he had been placed in as good condition as we thought it possible for him to attain, exploratory operation was carried out.

July 17, 1933, a right rectus incision was made. There was a chronic perforating ulcer on the anterior wall of the duodenum. The gallbladder was soft and flaccid, and seemed to be normal. Gastroduodenostomy was performed, using silk and chromic catgut. Thus, the alimentary current was shunted around the constricted, deformed duodenum. Immediate convalescence was uneventful and the patient was able to leave the hospital on the thirteenth postoperative day. He was dismissed from our care eight days later. His stomach was emptying properly, and all of his symptoms had been relieved.

Obstruction of the upper part of the gastro-intestinal tract may give rise to severe toxemia that may progress to gastric tetany, or toxic nephritis, and death may ensue if relief is not obtained by surgical intervention.

Medical care and a supportive regimen should be carried out until the patient is in condition for surgical treatment. Preoperative preparation always should be given if the obstruction is marked or if the chemistry of the blood has been altered. This preparation will consist in repeated aspiration of gastric content, and administration of fluids intravenously. Uncontrollable pain, particularly that which is projected to the back, is suggestive of actual or impending perforation of the lesion, and suggests the need of prompt intervention, especially if it occurs while the patient is under a carefully regulated medical and dietary regimen. Moynihan found that 117 deaths from perforated duodenal ulcer had occurred between 1910 and 1925 in the Leeds Infirmary, and that the perforating lesion was in an acute state of inflammation in eight cases only.

As has been stated, removal of the duodenal ulcer, and re-establishment of the normal continuity of the gastro-intestinal tract, is the logical course to adopt, especially if the patient is young, and if the operation can be carried out without any unnecessary risk; otherwise the operation of choice in most instances will be gastro-enterostomy. It has been a popular



method of treatment, and justly so, for when properly performed in cases in which it is applicable, it gives uniformly good results. The possibility of the development of a jejunal ulcer has been its greatest disadvantage. Apparently age is a factor in this tendency, for it is found that persons who are in, or have passed the middle span of life seem less prone to have jejunal ulcer after gastro-enterostomy. The procedure usually entails far less risk than any other operation that offers adequate solution of the problem. Furthermore, it must have a pronounced inhibitory influence on the inflammatory process, for Balfour and others have stated that they never have observed perforation of an ulcer of the duodenum after this operation. Timely surgical treatment is the best insurance against this complication.

Gastro-enterostomy has its greatest place in the treatment of duodenal ulcer, especially if the lesion is the cause of obstruction, as in the following case.

**Case XII.**—A man, forty-seven years of age, came for consultation in June, 1933. He had had difficulty with his stomach as far back as he could remember, but shortly before we saw him the attacks of epigastric distress had been of more frequent occurrence. Usually, the pain occurred about two hours after meals. The man had found that he could obtain relief by the use of food or soda. In the year preceding his visit to the clinic, the severity of the attacks had increased, and in the past few months an obstructive type of vomiting had been associated with the attacks. The patient had had his appendix removed in 1917, and cholecystostomy had been carried out in 1924. In spite of these procedures there had not been any remission of the attacks.

Analyses of blood and urine failed to reveal any abnormality. Analysis of gastric content after a test meal revealed that the value for free hydrochloric acid was 60, and that the value for combined acids was 74. Roentgenologic investigation of the gastro-intestinal tract gave evidence that there was a duodenal ulcer which was causing partial obstruction.

Posterior gastro-enterostomy was performed June 19, 1933. Many adhesions were present in the right upper quadrant of the abdomen, but the gallbladder was flaccid, and calculi could not be felt in it. There was a large lesion on the anterior wall of the duodenum, which may have been composed of more than one ulcer. It began just below the pylorus. The stomach was dilated as a result of the partial obstruction caused by the ulcer. Convalescence was uneventful, and the man left the hospital on the thirteenth postoperative day. Tonsillectomy was performed July 6, 1933. The patient also had a good deal of infection in and about his teeth, and he was advised to have these foci of infection eradicated as soon as he felt able. Some prostatitis, also, was present. The man left our care, July 13, 1933.

Gastro-enterostomy has given satisfactory relief in about 90 per cent of all cases in which it was the most logical procedure and in which it was properly performed. It entails far less risk than would be assumed, under these circumstances, in freeing the duodenum sufficiently to excise the lesion and perform a plastic operation, or in resecting the stomach. The latter procedure should be adopted only as a last resort. If the duodenal ulcer is reactivated after gastro-enterostomy, or if the ulcer recurs after excision, the symptoms are usually identical with those of the primary lesion. Reactivation of the lesion may be due to a poorly functioning gastro-enteric stoma, improper habits of living, the use of alcohol or tobacco in excess, unremoved foci of infection, and so forth. In the event that the symptoms are mild, medical treatment may be all that is necessary, but often surgical treatment is required, even though it must be carried out at considerable risk.

In the event a jejunal ulcer occurs following gastro-enterostomy, it is best to restore, as nearly as possible, normal gastro-intestinal continuity. The treatment usually consists in disconnecting the stomach from the jejunum, closing the openings in each, after excising the jejunal lesion, excising the original duodenal ulcer with the anterior two-thirds of the pyloric sphincter, and completing the operation as a gastro-duodenostomy. If the duodenum has become immobile, the risk of removing the cap and the primary lesion may be excessive, and it will be better to leave the ulcer undisturbed after disconnecting the stomach and jejunum. Should the duodenal lesion become active after this procedure, resection of the stomach may be indicated.

The syndrome of peptic ulcer is usually typical, although the symptoms may vary in intensity. Many factors may enter into the production of an ulcer of the stomach or duodenum, and once a lesion has formed, they undoubtedly continue to influence its course. Each case, therefore, presents an individual problem. Careful observation and attention to detail will be necessary in order to assure the patient of a plan of treatment best adapted to the existing condition.



In all cases, regardless of the nature of the operative procedure, there will be a distinct advantage in having the patient adhere to a carefully regulated medical and dietary regimen for several weeks following operation.

There is some evidence to show that disease of the gall-bladder or appendix may be an etiologic factor in the formation of an ulcer, and perhaps this amply explains the rather frequent coincidence of these conditions and peptic ulcer. Similarly, failure to detect and remove pathologic lesions in adjacent viscera may be responsible for postoperative symptoms which will be erroneously attributed to failure of the procedure. There is also the possibility that these processes that involve structures outside the gastro-intestinal tract may develop subsequent to the operation for peptic ulcer. This is especially true among patients who are in, or have passed, the middle span of life, the time when these lesions are most prevalent.

The results of treatment seem less satisfactory than they actually are because of these complications and because of the functional element in some cases which will not permit response to medical, dietary, or even surgical attention.

Our present methods of treatment have been demonstrated to be adequate, and were it not for the features of the situation which have just been mentioned, practically all patients with peptic ulcer would be completely relieved following the appropriate procedures properly performed.

#### DIVERTICULITIS

Diverticula are found more frequently in the large bowel than in any other part of the body. They rarely occur before a patient is forty years of age, but seem to be more common among men than among women, particularly those who have a tendency to be obese. In 1912, Giffin made a study of the symptomatology in twenty-seven cases. Since then there has been increased interest in the condition. The age of the patient and a tendency toward constipation seem to be etiologic factors.

For some reason, diverticula are most prevalent in the sig-

moid. Yet, disturbance due to them is relatively uncommon, when one considers the frequency with which they are known to occur. In W. J. Mayo's review of 2,139 cases, he found only 696 in which there was an associated inflammatory process. Most of the patients were treated by conservative measures. Although the neck of the diverticulum may be small, fecal matter often finds its way into the sac, and expulsion of these fecaliths is practically impossible. Hard feces within the normal lumen of the intestine increase pressure and cause irritation in a field in which large numbers of bacteria usually are present. Therefore, in the sigmoid, conditions are most favorable for the continuance of an inflammatory process once it has gained a foothold. It is not likely that much difficulty will result from diverticula except those of the sigmoid, because of the soft and liquid consistence of the feces at the time they pass through these other portions of the bowel.

Reports of three cases of diverticulitis of the sigmoid, recently encountered, will illustrate many of the problems that are associated with the diagnosis and treatment of this condition.

**Case XIII.**—A married man, aged thirty-four years, came to the clinic December 12, 1932, complaining of colicky abdominal pain, starting about the umbilicus and extending down to the scrotum. These attacks of pain lasted about two minutes, were intermittent, and continued for ten days. They were associated with a rise in temperature to 101.5° F., which came on in the evening. He had noticed a great deal of gas and gurgling in the abdomen. He had had recurrent attacks since the onset of the trouble, and increasing constipation.

On examination, there was some abdominal tenderness, and a palpable mass in the left lower abdominal quadrant. The blood pressure was 150 mm. of mercury systolic, and 100 diastolic. Roentgenograms of the colon gave evidence of obstruction at the juncture of the descending colon and sigmoid, with diverticulosis of the proximal part of the sigmoid. Other laboratory examinations were negative.

From a clinical standpoint, it was uncertain whether we were dealing with obstructive diverticulitis or with carcinoma. Operation, December 16, through a left rectus incision, gave evidence of extensive diverticulitis involving the descending colon and upper part of the sigmoid, in the center of which was a large, rather hard tumor. The tumor seemed much like a malignant growth, but proved to be the result of diverticulitis. The descending colon, beginning just below the splenic flexure, was removed down to the middle part of the



sigmoid, with the use of the Rankin clamp. In addition, a catheter was put in the proximal portion of the loop. January 4, 1933, clamps were applied to the spur left by colostomy; they were applied again on January 16, and January 25 the colonic stoma was closed.

The patient made a good recovery and has been in perfect health since leaving our care. He plans to return to have an inguinal hernia repaired.

**Case XIV.**—A physician, fifty-four years of age, had an attack of acute abdominal distress one year before he came for consultation. A diagnosis of a lesion of the sigmoid, and diverticula of the colon was made after roentgenologic examination. Similar pain and disturbance had occurred at intervals of two to three months; on one occasion he had a rise in temperature. There was much mucus with the stools. In an attack, three weeks before he came for consultation, he noticed a few drops of bright blood on the rough edge of the stool. At this time he had severe pain in the left lower quadrant of the abdomen for several days, followed by general abdominal tenderness.

The patient was in good general condition. It was impossible to feel any masses in the abdomen. The lower part of the abdomen was tender. The rectum prolapsed when the bowels moved. A few hemorrhoids were present. Other than considerable spasm, the proctoscopic findings were not significant. It was impossible to get the proctoscope up into the sigmoid. A tentative diagnosis of diverticulitis of the sigmoid was made. The patient left for home with the idea of giving medical and dietary measures a trial. When he returned in May, 1933, twenty-one months after the first examination, the sigmoid seemed to be fixed, and its lumen was contracted; 18 cm. of bowel below this region seemed to be in good condition.

May 29, 1933, transverse colostomy was performed. There was extensive diverticulitis of the sigmoid. The colon was edematous and thick. The bowel was not manipulated more than was absolutely necessary. Palpation of the gallbladder disclosed that it was large, and that there was a calculus in the lower end of it, or in the cystic duct. The condition apparently was not causing symptoms, and it was left undisturbed.

Convalescence was uneventful, and the man went home on the seventeenth postoperative day.

**Case XV.**—A woman, aged seventy-one years, came to the clinic May 23, 1933, complaining of pain in the back, lower part of the abdomen, and right thigh. She had been a patient of the clinic in 1929, at which time a diagnosis of nasal polyps and spondylolisthesis had been made.

The condition of which she complained had begun six months previous to her registration in 1933. One month before, she had noticed she was more constipated than formerly. It was necessary for her to use laxatives and to keep the bowels loose in order to get relief. There was considerable cramping abdominal pain, which was relieved by movement of the bowels, and which at times was associated with some abdominal distention. Her physician at home had found a mass in the left side of the pelvis.

When she was examined at the clinic she was in good general condition. The blood pressure was 144 mm. of mercury systolic, and 78 diastolic. General

examination gave negative results, except for a mass in the left side of the pelvis. Rectal examination did not reveal an intrinsic lesion. Roentgenograms of the colon gave evidence of diverticulosis of the left side of the colon, with an area of spasm in the sigmoid.

At operation, May 26, performed through an incision low in the median line, the uterus, oviducts, and ovaries were found to be normal. There was a tumor of the sigmoid, 4 or 5 cm. in diameter, just above the peritoneal fold. This tumor had perforated into the left broad ligament. The lesion appeared inflammatory, although we could not be absolutely certain that a carcinoma did not exist. A loop type of colostomy was made.

The patient made satisfactory convalescence, and was able to return home after five weeks. She has been asked to return in three or four months for reexamination.

Treatment of the acute and of the chronic phases of diverticulitis is usually conservative, but complications do develop, for which surgical intervention is imperative.

Sometimes, after diverticulitis has subsided, the bowel becomes obstructed from adhesions and angulation, or by formation of a tumor of fibrous tissue. In cases in which the obstruction is due to diverticulitis only, colostomy is the procedure of choice. Diversion of the fecal stream reduces the irritation and gives the inflammatory process a chance to subside. Furthermore, through-and-through irrigations can then be carried out to hasten recovery. As in Case I, the sigmoid may be so firmly sealed to adjacent structures that great difficulty and grave risk would attend any attempt to resect the bowel. Colostomy affords these patients satisfactory relief, for in many instances the diverticulitis so completely subsides that it is possible to close the bowel at a later date. Even if the colonic stoma has to be maintained, the patients are able to live comfortably after becoming accustomed to the stoma and after learning how to regulate evacuation of the bowel.

The presence of a mass in the lower part of the abdomen, particularly in the left side of the pelvis, and of symptoms referable to the bowel, may justify the suspicion that diverticulitis is present. However, the difficulty of making an accurate diagnosis by palpation is evident when one considers the possibility of pelvic and other tumors causing pressure and partial obstruction in the intestinal tract. In any considera-



tion of diverticulitis, the possibility of an associated malignant process must be kept in mind. In 1907 Moynihan pointed out the uncertainties attending the diagnosis of conditions intimately associated with diverticula. The relationship between diverticulitis and carcinoma is not well understood, but it is probably the same as that between inflammatory diseases and carcinoma in other parts of the body. Recently, in examining a patient with a typical diverticular process of the sigmoid, a piece of tissue was removed through the proctoscope for microscopic study. Had examination of this tissue not revealed the presence of an adenocarcinoma of grade 2, it would have been impossible to tell whether we were dealing with malignancy or diverticulitis.

In Case XIV, the patient had a definite tumor in the left lower quadrant of the abdomen, tenderness over the abdomen, elevation of temperature, and intermittent attacks of severe pain. Even though he was only thirty-four years of age and diverticula had been recognized in the proximal portion of the sigmoid, it was believed that some malignant disease also was present. When the mass in the bowel was exposed, it had the characteristics of a malignant growth. After its removal, careful study disclosed that it was made up of inflammatory tissue, and that there was no evidence of carcinomatous change. This illustrates how difficult it is to make an accurate diagnosis of the condition present in the bowel. In this particular instance, the tumor could be removed easily. This was done. After all, it was the best method of procedure, for it could be carried out at little additional risk, and it removed the threat of future annoyance and incapacity, with its consequent economic loss.

There is no doubt but that colostomy was the immediate need in Case XV, in order to relieve the severe pain and partial obstruction. The lesion had already perforated into the left broad ligament. The woman was seventy-one years of age, and it was not wise to attempt to do anything more than was absolutely necessary. Recognition of the diverticulitis preoperatively did not entirely dispel the suspicion that an ovarian tumor might be a factor in the disturbance of the bowel.

Although proctoscopic examination, and inspection at operation, revealed the characteristics of the lesion to be those of diverticulitis, which it may be, nevertheless the absence of associated malignant disease is not proved.

Diverticulitis is usually a slow process. Perforation of a diverticulum into the general abdominal cavity is rare, but when it does occur peritonitis ensues. One of our patients had had this experience. When the attending surgeon had made a right rectus incision he had found diverticulitis with perforation of the sigmoid, and feces free in the abdominal cavity. He then had closed the right rectus wound, had made a left rectus incision, and had lifted the perforated segment of bowel to the surface, as in a Mikulicz operation; he had washed out the abdominal cavity, and had established drainage.

About ten days after this operation the patient was brought to us. There were extreme sepsis and toxic jaundice. Following intravenous injection of glucose, and conservative measures, he gradually improved, and the acute inflammatory process subsided. We removed the loop of bowel containing the diverticulum, and five or six weeks later were able to close the colonic stoma.

Should an abscess develop from perforation of a diverticulum, ample drainage must be provided. A fecal fistula may ensue, and at times a second operation is required in order to close the opening in the bowel. The communications that develop between perforated diverticula and adjacent loops of bowel, and the fistulas that discharge their content through the abdominal wall are usually less difficult to control than those that drain into the bladder, causing discharge of gas and feces through the urethra. In the latter type of case, better results will be obtained from surgical treatment if the operation is carried out in stages: colostomy first, and then, later, closure of the openings in the viscera. It is usually difficult to carry out the required procedures, and they are attended by considerable risk.

The problems associated with diverticula of the sigmoid are many and varied. They often tax the ingenuity of those



most experienced in abdominal surgery and are rarely solved without great patience on the part of both patient and surgeon.

#### FOREIGN BODY IN THE STOMACH

**Case XVI.**—A man, aged twenty-eight years, came to the clinic because of intermittent attacks of abdominal pain during the preceding seven years. Usually these attacks had occurred about twice a year. Some of the symptoms were similar to those of peptic ulcer; he had found that a dietary regimen gave palliative relief. Following an examination in 1932, a diagnosis of gastric polyposis had been made. At operation elsewhere, early in 1933, a small portion of the wall of the stomach had been removed. Although malignant change had been suspected, the pathologist had been unable to make a definite diagnosis.

The patient had lost 20 pounds (9 kg.) and appeared emaciated. Erythrocytes numbered 4,490,000 per cubic millimeter of blood, and the concentration of hemoglobin was 60 per cent. The differential cell count and flocculation test for syphilis revealed no evidence of abnormality. Analysis of gastric content revealed total acidity of 48, and free hydrochloric acid of 40. There was a trace of blood in the material aspirated from the stomach during this test. Roentgenologic investigation revealed the presence of a large polypoid mass in the middle segment of the stomach, and parts of the wall of the stomach were suggestive of polypoid lesions. On the basis of the findings, it seemed probable that diffuse polyposis of the stomach was present and that there was likelihood of malignant change having taken place.

At operation May 12, 1933, it was found that there was extensive hypertrophy of the mucosa of the stomach, with multiple ulcerations along the lesser curvature. The stomach contained a foreign body 6.5 cm. in diameter. Resection of about four-fifths of the stomach was carried out, and closure was made by a posterior Polya type of anastomosis. The segment removed revealed diffuse polypoid hyperplasia of the mucosa. There were two ulcers in the suture line of the previous operation; one measured 17 by 10 by 6 mm. and the other 8 by 5 by 4 mm. They were in a subacute state of inflammation. The lymph nodes were reported to be inflammatory. The dark foreign body had a putty-like consistence, and chemical examination revealed that it was organized blood.

Convalescence was uneventful and the patient was dismissed from the hospital on the fourteenth day after operation. Although the flocculation tests of the blood had given every evidence that it was normal, we felt justified in carrying out a course of antisyphilitic treatment because of the pathologic changes that were present throughout the stomach.

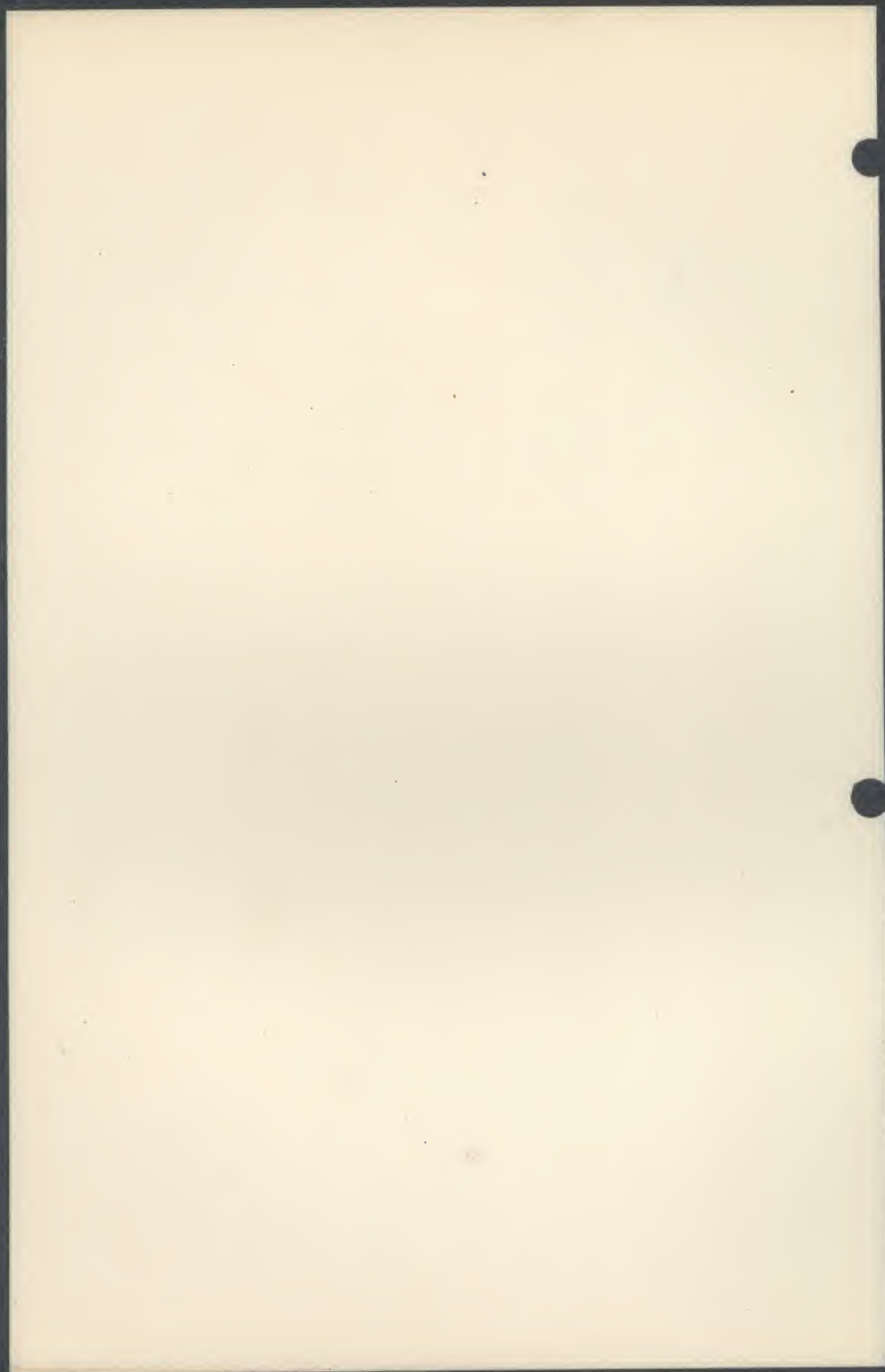
The large bezoar evidently had formed rapidly, as the physician who resected a portion of the stomach one year previously reported his findings as "enormous hypertrophy of the mucous membrane." Probably the most common bezoar is that formed chiefly of vegetable matter, namely, a phytobezoar. Usually the nucleus is a foreign substance. As the

concentric layers of mineral, vegetable or animal matter are deposited about this, the bezoar is built up. Nervous women sometimes chew their hair, and when the particles are swallowed a hair ball may be formed in the stomach, that is, a tricho-bezoar. Shellac is occasionally used as a stimulating beverage. It may make a large concretion in the stomach, or it may aid in joining vegetable particles into a mass.

Gastritis or gastric ulcer often develops if a foreign body is present in the stomach, apparently caused by trauma. In the case reported here ulceration and hyperplastic change in the mucous membrane were associated.

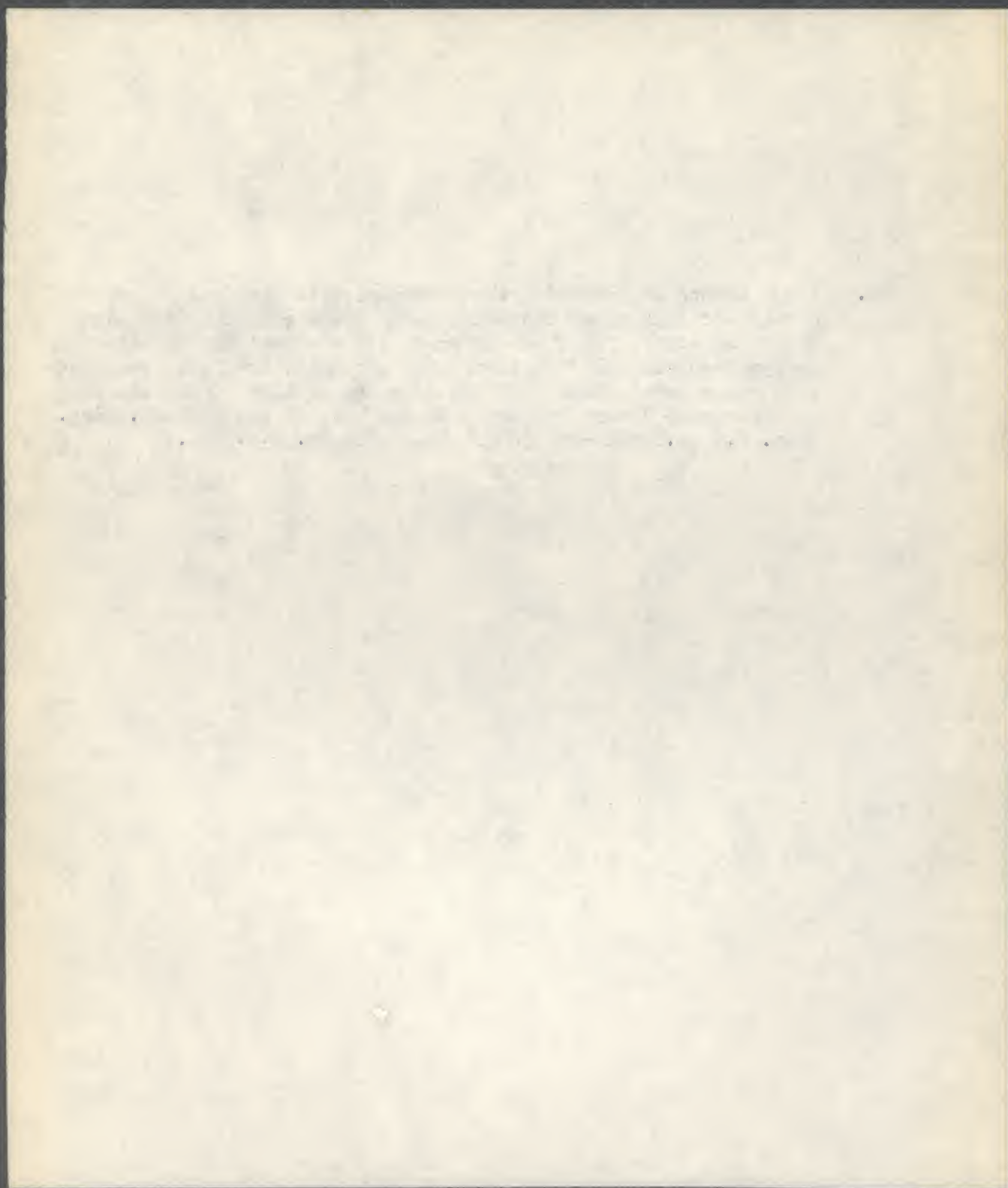
The complications that are likely to result from the presence of a foreign body in the stomach are hemorrhage, perforation, and obstruction. After the operation the patient told us that previously he had vomited blood-tinged material at intervals, but apparently the bleeding was never severe. The foreign body was too large to pass through the intestinal tract and be discharged.





25. A new method of improving the abdominal wall preliminary to closure of intestinal fistulas; independent carcinoma of colon occurring six years after cancer of the stomach; the treatment of pharyngo-esophageal diverticulae in the aged; surgical procedures that solve outstanding problems in cases of ulcer of the stomach and duodenum; diverticulitis; foreign body in the stomach. Surg. Clin. N.Amer.14:521-551 (June) 1934 with Dr. E.S.Judd.)







## SOME PROBLEMS IN SURGERY OF THE BILIARY TRACT\*

BY

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It has long been recognized that surgery offers better results than other forms of therapy in pathological conditions of the gallbladder and bile ducts. As early as 1667, Michael Ontmuller stated, "There are no medicines which will dissolve gallstones."

Much has been written about clinical *versus* pathological cholecystitis. Frequently the symptoms are not comparable to the pathologic changes exhibited. A patient may give a very vague, indefinite story in reference to the biliary tract, and yet have a very badly diseased gallbladder; for instance, an empyema or perforation may have occurred into a neighboring viscus, as the liver. On the other hand, a typical gallbladder history may be presented, as severe attacks of colic with pain radiating to the back and up under the shoulder, followed by residual soreness, yet that patient may have only a mild inflammatory condition—a so-called clinical cholecystitis.

Between these extremes there are many variations, and the diagnosis may be difficult. Because of the mild symptoms and the atypical features frequently present in the history, cholecystography has done much to enable us to recognize disease that might otherwise have been overlooked. A positive diagnosis with cholecystography clinches the matter. However, we do not hesitate to advise operation in those cases in which the history is indicative, although the gallbladder function is apparently normal from the roentgenologic study, for stones may be present and still not show in the roentgenogram. If gallstones are found in the course of operations on other organs, removal is advised, because if they are left undisturbed they frequently give trouble later in life when the patient is not in a good condition to stand surgical procedures.

Even if symptoms are mild, in the presence of a diseased gallbladder, one should not permit the process to continue until such complications as hepatitis, pancreatitis, cholangitis, common duct stone, or perforation of the gallbladder develop. An operation should be done before irreparable damage has taken place in the liver, the pancreas, or the common duct, since deferred operation is responsible for the incomplete relief of symptoms in some cases. If the patient has had symp-

toms for many years, we commonly find that operation is necessary, not for the gallbladder disease alone, but for complications as well. Good results following cholecystectomy can be expected in 90 per cent of all cases seen. The risk involved in operation in an uncomplicated case will be about 2 per cent, while that of the complicated case will be between 5 and 10 per cent, depending upon the complicating factors.

One of the greatest problems in surgery of the biliary tract is, when should the common duct be opened and drained? Clinically, a common duct stone can be suspected if the patient has had jaundice with attacks of colic; however, a common duct stone may be present without jaundice. Jordon and Weir, in a study of 106 cases of stones in the common duct, found that jaundice had never been present in 13 per cent.

A carefully taken history is most important in the diagnosis of biliary tract disease. Crum, in a study of 1,000 consecutive autopsies of patients between the ages of 9 and 94, found gallstones in 325 instances, in 78 of which stones were in the common duct also, an incidence of common duct stones of 24 per cent in patients having gallstones. Lahey thinks that prior to 1926, he left a common duct stone in one out of every 10 cases in which he did a cholecystectomy, because he did not realize that these stones occurred without giving symptoms. This complication has increased in his clinic from 8 per cent to 19 per cent, since 1926, the explanation of which is that in this clinic the common duct is being opened more frequently. Kehr stated that the most experienced surgeons may overlook common or hepatic duct stones. He is convinced that when cholecystectomy only is done, on the basis of the history, from 15 to 20 per cent of duct stones will be overlooked. He also insists that a common duct stone may be present for a long period of time without symptoms. In every case in which jaundice is present with attacks of biliary colic, the common duct should be explored for stones and drained.

Normally, the common duct is about the size of a goose quill, thin walled, and bluish in color. Inspection of the duct is the best guide as to whether or not it should be opened. The common duct becomes dilated after the function of the gallbladder has been destroyed, or after the gallbladder has been removed. A duct dilated more than would be expected from the loss of function of the gallbladder should be opened. Palpation of the duct is excellent practice if a stone can be felt; otherwise little reliance can be placed upon it. Frequently stones are in inaccessi-

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ble places, such as the hepatic ducts or the ampulla, where palpation is not satisfactory because the head of the pancreas surrounds this part of the duct.

Obstructive jaundice associated with a thick-walled, contracted gallbladder is due to a common duct stone (Courvoisier's law). We have also learned that a thick-walled, contracted gallbladder, not associated with jaundice, is often associated with common duct stones. In these cases the common duct should be explored. In the presence of thickening of the head of the pancreas or a marked hepatitis, an exploration of the common duct followed by prolonged drainage is frequently advisable. After the ducts are cared for, the gallbladder is either removed or drained, depending upon the individual case. Judd and Priestly, in reviewing ultimate results of operations on the biliary tract, found that relief of symptoms was more complete when the common duct was drained. If the duct is large enough, exploration of its interior with the finger gives best results. Otherwise exploration with a scoop may reveal a stone in the ampulla, or, with this instrument in place, one may be able to palpate a stone along its shaft. A stone may be overlooked after a careful exploration with the duct open.

Although a continuation of attacks of colic following cholecystectomy is for the most part due to an overlooked common duct stone, there is a small group of cases in which, on exploration, no common duct stones can be found. They are all diagnosed common duct stones, but from a clinical standpoint, the jaundice is either slight or not detectable. In studying a group of these cases one of the striking things found was the long duration of symptoms before surgery was done. Judd and Deaver have studied these cases on several occasions, and have found on exploration that there is no consistency in the findings. Either a dilated duct, hepatitis, pancreatitis, cholangitis, or a combination of two or more of these was found. In a few cases, the symptoms were thought to be due to a spasm of the sphincter of Oddi. Tallman has recently made a careful review of the recurrent symptoms after cholecystectomy, and believes that if a common duct stone is ruled out, the symptoms are due to disease in the biliary tract secondary to the primary gallbladder condition or to a neuro-physiological reflex initiated by a change in function of the common duct and biliary radicals.

Prolonged drainage of the common duct is advisable in all cases in which persistent colic or jaundice occur after cholecystectomy. For this purpose, the T-tube, described by

Kehr and known in this country as the Deaver tube, gives very satisfactory results. It is the only type of drain that can be kept in with certainty for a considerable period of time. A complete control of the flow of bile can be maintained; the bile may be allowed to flow to the outside or, by clamping the long arm of the tube, it can be forced into the duodenum. This tube is also of advantage in feeding certain patients, particularly those who tolerate liquids poorly by mouth or who have a poor cardiac reserve. This procedure lessens the amount of glucose required by vein.

Recently, it has been found that injection of these T-tubes with a radiopaque oil before they are removed further assures patency of the ducts. With this procedure we are able to learn more about the pathological processes present in the liver, and we are further helped in estimating the final outcome. From a clinical standpoint, patency of the ducts can be determined fairly accurately. One can be certain that the ducts are patent if on clamping the tube, there is no discomfort in the upper abdomen, if no jaundice is found clinically or by serum tests, and if there is no leakage about the tubes. However, in certain cases, due to marked hepatic injury, jaundice will be slow to disappear and the stools will be slow to return to normal color. It is in this group that visualization and determination of patency of the duct is particularly advantageous.

In the common duct stone cases without jaundice, the tube is usually left in about a month. In cases with jaundice it is not removed for several weeks after all icterus has disappeared. Part of this time the tube is clamped because continuous drainage for too many days will produce a state of hepatic shock. This clinical entity is characterized by abdominal distress, rise of temperature, weak, fast pulse, sweating, decrease in blood pressure, and an increase in the blood urea to about 100 mg. per 100 cc. Such an outcome can be frequently predicted in elderly patients with liver damage. This condition should be prevented or treated by the administration of 10 per cent glucose intravenously and by giving bile by mouth, which is the best known stimulator of biliary secretion.

In the post-cholecystectomy colic group not due to stones, I think that drainage from six months to a year is advisable. These patients are usually very grateful and do not want to give up their T-tubes. One patient kept her tube in for three years, having it removed only when it began to disintegrate, because her relief from symptoms was com-



plete while it was in place. I have seen no reports of stricture from this type of prolonged drainage.

The tube is usually easily removed by traction on the long arm and with very little discomfort to the patient. When difficulty is experienced in withdrawing the T-tube, it usually can be removed easily the following day. If there is no obstruction to the gut end of the duct the fistulous tract will close promptly.

#### SUMMARY

1. Cholecystectomy should be urged early in the course of gallbladder disease in an effort to lessen later complications.

2. The common duct should be inspected in every operation on the gallbladder: (1) to prevent injury to the duct, and (2) because if the duct is found dilated, the indication is that stones are probably present.

3. The common duct should be opened in the following types of cases: (1) attacks of biliary colic with jaundice; (2) thick-walled and contracted gallbladders; (3) dilation of the common duct to a greater extent than would be expected from loss of function of the gallbladder; (4) chronic pancreatitis, and (5) persistently recurring attacks of colic following cholecystectomy.

4. Prolonged drainage with the T-tube is the procedure of choice, as complete control of the situation can be had at all times.

5. Visualization of the biliary tree with radiopaque oil before removal of the tube proves the patency of the ducts and gives a better estimate as to prognosis.

#### Medical Arts Building.

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#### ABSTRACT OF DISCUSSION

Dr. Frank L. Barnes, Houston: Dr. Phillips' paper is a valuable contribution to our program, and I believe it is in line with the best surgical opinion and practice. What I shall have to say in discussing it, will be more by way of emphasis than otherwise.

If we stop to consider the manifold functions of the liver and biliary system and that these functions are interrelated and interdependent, one on the other, we will be amazed that the surgical problems of the biliary system are handled so well and, in a majority of instances, so simply.

If we view the surgical problems of the biliary tract in their simplest terms, we look upon the diseased gallbladder as a source of infection, or rather as a link in the chain of infection existing between

the liver, bile ducts, pancreas, spleen and other organs, and, upon the bile ducts, as being the drainage system of the liver.

The gallbladder then must, at times, be treated or removed in order to break this chain of infection, and the bile ducts must be kept open, since proper drainage is an absolute prerequisite to good liver function.

With these principles in mind, we will be constantly confronted with the problem as to how far we should go in instituting measures of relief in a given case.

Surgery of the biliary system should, as a rule, I think, be approached with an open mind and with good and sufficient equipment. The predetermination to drain the gallbladder, or to remove it, or to open and drain the common duct, constitutes, in my opinion, one of the chief hindrances to the success of biliary surgery. We should seek here, above all places in the abdomen, to exercise such sound, sober, surgical judgment as may be required by the special problem presented.

Granting, then, that all data, including the clinical history, the physical examination, the cholecystogram, the liver and kidney functions, icterus index, the van den Berg test, the blood coagulability and the presence of or history of jaundice, have all been duly considered and properly evaluated and an adequate incision has been made, it is then that the problem is fully presented and, what to do, and how to do it is definitely up to us.

The surgery of the gallbladder alone presents many important problems, and I am glad to agree that a diseased gallbladder should be removed early in order to prevent serious consequences, but there are cases in which, for one reason or another, it may be too difficult or too dangerous to undertake its removal and I would like to call attention to the fact that drainage of the gallbladder has cured many cases and is still a good operation.

The crucial test of the efficiency of gallbladder drainage is to have bile come through the cystic duct into the gallbladder while the abdomen is still open. If bile does not come into the gallbladder during the operation, drainage of the viscus will do no good except in cases where the disease is practically limited to the gallbladder.

In obstructive jaundice, where remission of the jaundice is not obtained, and where the patient is growing toxic and the liver function is going steadily down, prolonged drainage of the gallbladder is a good decompressive measure, but here again, we must get bile to come into the gallbladder during the operation, and if we do not, we must take a long chance and, using the gallbladder as a guide, proceed to open and drain the common duct.

I have not supported the proposition that the common duct should be opened and explored in all cases of cholecystectomy done for stones in the gallbladder; however, there are a great many associated circumstances which make the practice appear sound. I think that the history of or the presence of jaundice with pain and colic, associated with the passage of dark urine, constitutes the best clinical indication for opening and draining the common duct, but the type of jaundice must be carefully differentiated and its significance properly judged.

I am in accord with the author in all the indications he gives for opening and draining the common duct, except for the relief of persistent biliary colic following cholecystectomy. If there is a history of jaundice at any time prior to the cholecystectomy, or if jaundice supervenes at any time following the cholecystectomy, I would consider exploring the common duct. But if the duodenal tube showed that bile was coming into the duodenum and the serum bilirubin was not high, I would favor pro-



longed medical treatment. I have had a number of these patients to get well without further surgical intervention.

Dr. Crile in 1926 or 1927 showed, rather conclusively I think, that these attacks of colic, dyspepsia, and pain following cholecystectomy are usually due to some disturbance of the nerve supply of the liver and biliary system superinduced by the cholecystectomy, and he devised a gallbladder dissection and a drainage system of the gallbladder area looking to the prevention of this distressing condition.

The postoperative observation and direction of these patients, as suggested by Dr. Phillips, is also very important. We ought at least to know that biliary drainage is competent and that liver function is restored as fully as possible. These observations should begin immediately following the operation.

**Dr. Judson Taylor, Houston:** Dr. Phillips has presented to us in a very interesting way the modern interpretation of many of the problems in surgery of the biliary tract.

Dr. Barnes in his discussion has added many valuable facts gleaned from his long experience in this field of surgery.

Ideal cholecystotomy, by which is meant the opening of the gallbladder, the removal of stone, and the closure of it without drainage, and cholecystectomy without drainage are not universally accepted procedures. On the other hand, cases of cholecystotomy and cholecystectomy are usually drained. The institution of drainage in any abdominal wound predisposes to hernia.

It is on this matter of drainage and the predisposition to hernia in these cases that I wish to speak. Sometime ago when it was my custom to open the abdomen by splitting the right rectus muscle and drain through the original incision, hernia developed with sufficient frequency to cause embarrassment. In the presence of infection drainage of any kind, of long or short duration, tends to cause the wound to break down. To obviate this, in my opinion, drainage should be made through a stab wound and never through the wound of incision.

It is my opinion that a right paramedian incision of sufficient length, with retraction of the right rectus muscle outward, gives the most satisfactory approach. This incision has to be a little longer than a more lateral approach, and the mechanics of the operation are a little more difficult for the operator, but a hernia is most unlikely if the drainage is through a stab wound. This incision is ideal for operations upon the common duct and in case of necessity it is an entirely satisfactory incision for operations upon the stomach.

There are a few little maneuvers that have always been of advantage to me in this work, to which I wish to invite attention. It is the general custom, I believe, in a large empyema of the gallbladder, when a cholecystectomy has been decided upon, to empty the gallbladder of its contents before

proceeding to its removal. This process of emptying is conducive to infection. It is a much simpler procedure to nick the peritoneum where it is reflected over the fundus of the gallbladder, insinuating the left forefinger between the liver substance and gallbladder, and in an inflamed friable state, the gallbladder will peel off of its bed in the liver and the distended organ can be held in the palm of the hand with the left forefinger behind and the left thumb anterior to the cystic duct. Then, with perfect safety to the common duct and the hepatic duct, a forceps can be applied to the cystic duct and the gallbladder removed without emptying it. On the other hand, in doing an ordinary cholecystectomy, it is preferable and safer to remove the gallbladder by first clamping and cutting the cystic duct. The little maneuver in my hands which makes this easy and safe, is to clamp the fundus of the gallbladder with a hemostat, make traction, clamp the ampulla of the gallbladder with another forceps, and make traction. This exposes the cystic duct and the common duct and separates them. Holding the latter clamp in the left hand, then the cystic duct can be caught between the left index finger and thumb and a forceps can be easily slipped under it by the right hand. In this way the cystic duct can be clamped safely, without danger to the common or hepatic ducts and without any rotation of the liver. The gallbladder then can easily be pulled from its bed.

**Dr. Tate Miller, Dallas:** I must apologize for speaking as an internist in a surgical section. There are three arguments that I always lose: one, when I argue for medical treatment before an audience of surgeons, and the other two, when I recommend partial gastrectomy for peptic ulcer or cholecystectomy for mild gallbladder disease when the patient is himself a surgeon. It seems odd to me that I have not heard of a surgeon who has subjected himself to a partial gastrectomy, and rarely even to a gastro-enterostomy (which, on good surgical authority, is a simple procedure), when surgeons are such frequent sufferers of duodenal ulcer.

It is to be remembered that there are degrees and graduations of gallbladder infection, many of which, if diagnosed early, will respond to medical treatment. A few years ago we did not recognize cholecystitis until it reached a stage that could be treated only by surgery.

It would seem a good plan if the internists could read their papers to the surgeons and the surgeons read theirs to the internists, instead of each of us listening to our confreres tell us things that we already know and believe.

**Dr. Phillips (closing):** There are many more problems in the surgery of the biliary tract that have not been discussed here, and of course many new ones will continue to develop. Once the diagnosis has been made and surgery has been decided upon, with the abdomen open the surgeon has quickly to decide what procedure will give the patient the best chance of relief, with the least risk.

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## PRIMARY INFLAMMATORY STRICTURE OF THE COMMON BILE DUCT

J. ROBERTS PHILLIPS, M.D. AND F. HARTMAN KILGORE, M.D.

HOUSTON, TEXAS

**S**TRICTURES of the common duct have, as their usual cause, trauma at the time of cholecystectomy. They occur most commonly in slender individuals because the biliary structures can be lifted up so easily. If identification is not carried out, the common duct can be readily injured. As the technique of cholecystectomy has improved, fortunately fewer strictures are being seen. The treatment of such condition offers one of the biggest problems in the surgery of the biliary tract.

The patient, female, aged seventy-eight, registered April 27, 1934 complaining of jaundice of three weeks' duration. This had been associated with abdominal distress, bloating and distention. The stools were clay colored. There had never been any previous history referable to the biliary tract. There was no vomiting. The bowels had been moving with enemas. There was no blood in the stools.

Examination revealed an elderly, emaciated, jaundiced lady. There were no palpable glands in the neck. The examination of the chest was negative and the blood pressure was 140 systolic and 75 diastolic. There was evidence of free fluid in the abdomen. Examinations of the rectum and pelvis were negative and the urine analysis was negative, except for bile. The hemoglobin was 85 per cent, R.B.C. 3,750,000; W.B.C. 10,800. The serum bilirubin was 6.3 mg. per 100 c.c. of blood, direct reaction. The blood urea was 12 mg. per 100 c.c. of blood. The blood Wassermann reaction was negative. The examinations of the stools for

bile were repeatedly negative. The x-ray examinations of the stomach and chest were also negative. There was marked calcification of the abdominal aorta and a calcified circumscribed, lesion the size of a hen's egg near the dome of the liver.

One day after admission there was a circulatory collapse, associated with coma, but she recovered after the administration of glucose intravenously. The patient's condition was never good; and in spite of intravenous glucose, her course was constantly downward. There was practically never any fever. We felt that the diagnosis was probably a carcinoma of the head of the pancreas with obstructive jaundice. In spite of the fact that she never had any pain referable to the biliary tract, there was no proof that she might not have a common duct stone. For this reason we always advise exploration, the patient's condition warranting it. Should a malignancy be discovered, a side-tracking operation will relieve the jaundice and the severe itching, and will allow the patient to enjoy relief for a time.

At death, an inflammatory stricture which involved the common hepatic duct and extended into the liver, was found. The cross section of the common duct showed a marked thickening due to fibrous tissue and clumps of diplococci. The gall bladder did not appear to be diseased, it was flaccid and there were no stones in it or in the common duct. The pancreas also appeared normal. The biliary ducts above the stricture were markedly dilated (hydrohepatosis). The liver itself was small. The area of calcification, described in the x-ray report proved to be a calcified cyst

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of the liver. Examination of the entire gastrointestinal tract was negative.

These strictures are a result of an obliterative cholangitis. Obstructive jaundice occasionally develops months or even two years after removal of the gall bladder, due to stricture. These must be due to an inflammatory process, which existed at the time and continued after cholecystectomy. We have at times seen a diffuse obliterative process, in the extra hepatic ducts, the

opening in the ducts being insufficient to admit even a small tube for drainage. To see a localized obliterative process in the ducts is unusual, in the absence of pathology in the gall bladder. Strictures in the ducts present the most difficult tasks in surgery. In the case under consideration, the best procedure would probably have been to produce an external biliary fistula and later transplant it to the duodenum.



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## Carcinoma of the Colon\*

John Roberts Phillips, M.D., Houston

Carcinoma of the colon may cause no symptoms until ulceration or obstruction has occurred. Although subjective and objective evidence of a colonic lesion be very indefinite, x-ray examination will reveal the lesion anatomically and by it, its nature can usually be distinguished. The clinician who has a colon ray made in all cases in which there is only slight suspicion, will be the one to find colonic carcinoma in its early stages. Most of the cases in the past had symptoms from six to nine months before a diagnosis was made and since bleeding is often the first symptom, about one-third of the cases have had a hemorrhoidectomy for supposed "Piles," while in reality a carcinoma of the rectum, rectosigmoid or sigmoid existed.

Most of the cases of cancer that occur in the large bowel and rectum occur within reach of the examining finger. If this fails to reveal a lesion, then a proctoscopic examination should be made. This is the only way of diagnosing high rectal or low sigmoidal growths. Above the low sigmoid, the x-ray will find the remainder of colonic cancers.

Any case, then, that has a change in their bowel habit, any rectal bleeding or evidence of obstruction, should have these investigations done to prove or disprove the presence of a colonic lesion. There will be a few cases where one feels that something is wrong somewhere but cannot be sure where. This is particularly true in those cases of unexplained anemia. In fact, a diagnosis of pernicious anemia is rarely made now without excluding the colon and stomach by x-ray, because cancer in these organs may produce an anemia which is indistinguishable from pernicious anemia.

A palpable abdominal mass may be the first sign in a colonic malignancy. This is frequently the first sign in cecal carcinomas. A growth may attain considerable size in the cecum if the ileo-cecal valve is not involved, without causing obstructive symptoms because of the liquid content of the bowel.

Lesions in the left half of the colon usually cause obstructive symptoms relatively early, because of the fact that they tend to encircle the bowel (signet ring type) and because of the solid nature of the fecal stream. If any lesion in the colon is at all suspected, an x-ray examination by barium enema should be made, for if barium is given by mouth an incomplete obstruction may be made complete.

Burgess, in reviewing cases of intestinal obstruction from his hospital in Manchester, England, found that one-third of all cases

were due to stenosis of the large bowel and further felt that if one can exclude hernia and intussusception and localize the lesion to the colon, the chances are nine to one that malignancy will be the cause. Almost always, the malignant growth is situated in the left half of the colon and usually at or near the rectosigmoid juncture.

The things that have to be differentiated from cancer of the colon are tuberculous colitis and localized areas of chronic ulcerative colitis. In the left half of the colon, the most confusing lesion is a diverticulitis. In 1907, Moynihan published "The Mimicry of Malignant Disease in the Large Bowel." In this paper he pointed out the uncertainties attending the diagnosis of conditions intimately associated with the diverticula. With the lesion in hand, the surgeon occasionally is unable to say whether the lesion is malignant or benign.

The necessity of the combined efforts of internist and surgeon is being more and more keenly recognized in the management of all chronic abdominal diseases and this is particularly true of malignancy of the large bowel.

Many of the cases when first seen are anemic, dehydrated and to a greater or less degree suffering from a low grade obstruction. After the diagnosis is made, the patient is usually put in the hospital where these things can be overcome. Every effort is made to get the patient in as good condition as possible. Fluids are given freely by whatever method best tolerated. The anemia may have to be combated by transfusion. The bowel is thoroughly decompressed and cleansed by rectal irrigations and by mild laxatives. It is important to have the bowel flat and as empty as possible of fecal content. It thus lessens the chances of contamination at the time of operation. Hermann has shown that obstruction of the colon which is accompanied by an ulcerating lesion produces a condition which increases the permeability of the colonic wall. At operation, then, it is important not to handle the bowel any more than is absolutely necessary, as the bacteria have a tendency to go directly through the wall of the intestine.

In addition to the measures already mentioned for quickly getting the patient in as good condition as possible, the use of intraperitoneal vaccines prepared from streptococci and colon bacilli, obtained from cases who have died from peritonitis, have greatly decreased the mortality rate. The vaccine is given three days before the contemplated date of operation. Usually, there is a slight

\*Read at the Methodist Hospital, Houston, Feb. 19, 1935.



rise in fever, some abdominal tenderness and a general feeling of malaise. These symptoms usually subside within twenty-four hours.

Operation on the colon in stages has greatly lowered mortality. The surgical procedures of the colon have fairly well been standardized. For lesions of the right half of the colon as far as the mid-transverse colon, an ileo-colostomy followed in two to three weeks by a resection of the right colon is the procedure of choice. Occasionally in small growths without much infection occurring in well preserved, good risk patients, a resection in one stage can be done.

For lesions involving the transverse colon, an obstructive resection over a clamp as described by Rankin has proved its merits. The mortality has been lessened. It takes in the advantage of the Mikulicz operation and has the added advantage of getting rid of the growth at the time of the operation. Primary anastomosis is rarely advisable because of the variability and uncertainty of the blood supply. Rather than to have the bowel completely obstructed, we elect to put a catheter in the proximal loop. This not only permits expulsion of gas and keeps the patient comfortable, but also, by leaving the clamp in place longer, the tissues have a chance to seal in better. Thus, there is less chance of the loops slipping back when the clamp falls off, which occurs about the seventh to tenth day.

In low sigmoidal growths where the growth is too low to be delivered, either an anterior resection over a tube, as a second stage to colostomy can be done, or a combined abdominal perineal resection, either in one or two

stages, depending upon the condition of the patient.

Operability often cannot be told until the abdomen is open. It should be the practice immediately upon opening the abdomen to examine the liver and lymph nodes for metastasis and leave examination of the growth until last, for mere handling of the growth may lead to peritonitis, due to either infection about it or the increased permeability to the bowel wall secondary to obstructed because it gets rid of the infected ulcerated mass. The patient will then improve generally; the anemia will lessen and also the pain which often is severe in the terminal stages, is lessened, for if these growths are left alone, they involve adjacent viscera and nerve structures. A patient can die of a metastatic liver lesion in relatively little pain.

The outlook on colonic malignancy is hopeful. The operability remains at about fifty percent. The percent of five-year cures is encouraging and even if five years is not reached, comfort and prolongation of life for one, two or three years is justifiable. Most of the colonic lesions as determined by Broders' index of malignancy are of low grades (one and two). Longevity can be fairly well estimated by grade, by absence or presence of lymph nodes and by absence or presence of peritoneal involvement. It has been found that peritoneal involvement is as bad a prognostic sign as lymph node involvement.

The risk of resection of colonic malignancy is not high when it is considered that one, in handling them, has constantly to consider infection and often inadequate variable blood supply.

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# MYOSARCOMA OF STOMACH

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HOUSTON, TEXAS

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## MYOSARCOMA OF STOMACH

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SARCOMATA of the stomach are exceedingly rare, comprising only about 1 per cent of gastric malignancies. The "exogastric" forms appear usually as sharply defined tumors and sometimes have a distinct pedicle. The



FIG. 1. Large ulcerating lesion on the lesser curvature near the pylorus.

Myosarcoma is difficult to distinguish from spindle cell and round cell sarcoma, though the latter are encountered more frequently. Ewing<sup>1</sup> says that about 1 per cent of gastric malignancies are sarcomata while Fenwick<sup>2</sup> places the percentage a little higher.

The etiology, pathology and clinical aspects of myosarcoma have been discussed adequately by Gaber, Tufts and Witte<sup>3</sup> and Edwards and Wright<sup>4</sup> have reviewed the literature up to 1933 and found reports of 38 cases. Gaber, Tufts and Witte<sup>3</sup> report one case with recovery following operation.

Myosarcomata of the stomach usually arise from the curvatures and often project into the peritoneum as solitary solid tumors and cystic tumors and may attain enor-

"endogastric" forms are usually also pedunculated.

The structure of the myosarcoma varies; sometimes the cells are distinctly muscular in type, while in other cases the predominant cell may be of the large spindle cell variety. Sometimes there is a mixture of cells.

The following case is reported because of the rarity of the tumor and also because of the few symptoms which the patient presented, namely, marked anemia and slight indigestion.

J. G. J., aged thirty-one years, American, was admitted to the Memorial Hospital on February 3, 1936, complaining of pallor, fatigue and indigestion. The present illness dates back ten

years when the patient became conscious of increasing pallor. This was the only symptom noticed until about two months ago when the

white blood cells numbered 7550; 75 per cent of which were polymorphonuclears, 1 per cent were basophiles, 26 per cent were small lymphocytes



FIG. 2. Posterior Polya type of operation.

patient noticed acute pains in the epigastrium following meals. The history is interesting due to the fact that it is almost entirely negative except for the increasing pallor and slight fatigue on exertion. The appetite has always been good. The bowels moved regularly twice daily. There had been no loss in weight, vomiting, hematemesis or melena.

The past history was negative except for the usual childhood diseases and malaria in 1920. There were no previous operations. The family history was essentially negative.

Physical examination revealed a well developed white male of about the stated age of thirty-one years. There was a marked pallor of the skin. The physical examination was negative except for a marked pallor. The blood pressure reading was 110 systolic and 70 diastolic. There was slight tenderness on pressure in the epigastrium but no rigidity, masses nor scars. On admission the red blood cells numbered 1,390,000 and the hemoglobin was 35 per cent. There was a marked achromia, a moderate anisocytosis and an occasional poikilocyte. The



FIG. 3. Resected specimen consists of about four-fifths of the stomach and shows a large calloused, malignant ulceration.

and 5 per cent were metamyelocytes. The urea nitrogen was 18 mgs. per 100 c.c. The blood chlorides were .537 per cent. The urine examination was negative.

The x-ray revealed a large ulcerating lesion on the lesser curvature of the stomach near the pylorus (Fig. 1).

Four transfusions of whole blood by the multiple syringe method were given on four successive days, totaling 2310 c.c. The red blood count following these transfusions was 4,000,000 with 74 per cent hemoglobin.

The abdomen was opened on February 7, 1936, under ethylene and ether anesthesia, through an upper left rectus incision. On examination of the stomach a large ulcerating growth was found on the lesser curvature of the stomach near the pylorus with evidence of glandular involvement in the immediate area. There was an attachment to the pancreas so that resection of the pylorus had to be more extensive than usual. About four-fifths of the stomach was removed and a posterior Polya anastomosis was done, joining the side of the jejunum to the end of the stomach (Fig. 2).



Grossly, (Fig. 3), there was a large, dollar sized crater lesion on the lesser curvature of the stomach about 2 cm. from the pylorus. The

toms except those from a secondary anemia. Any case with an unexplained anemia should have a fluoroscopic examination



FIG. 4. Photomicrograph shows the myosarcomatous nature of the growth.

walls of the lesion were markedly raised and considerably infiltrated. Opposite the base of the crater there were several large glands forming a conglomerate-like mass about 4 cm. in diameter.

Microscopically, (Fig. 4), the entire wall of the stomach and the glandular mass were made up of densely packed, very large spindle shaped cells having fairly long fibrils. There were a number of myotic figures. No epithelial cells were found. A pathological diagnosis of myosarcoma, grade IV malignancy, was made.

The patient made an uneventful recovery and was dismissed from the hospital February 18, 1936, fifteen days following admission and eleven days following operation. At the present time the patient is in good health and has returned to his work in the oil fields.

#### CONCLUSION

A case of myosarcoma of the stomach is reported. There were practically no symp-

made of the stomach to exclude ulcerating or polypoid lesions. Lesions of the right colon will likewise cause a severe secondary anemia.

The adequacy of radical resection for malignancies in the stomach has been shown a number of times. We are hopeful that this patient will be cured, however, if palliation only has been afforded it will be quite worthwhile.

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# MYOSARCOMA OF STOMACH

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## MYOSARCOMA OF STOMACH

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**S**ARCOMATA of the stomach are exceedingly rare, comprising only about 1 per cent of gastric malignancies. The "exogastric" forms appear usually as sharply defined tumors and sometimes have a distinct pedicle. The



FIG. 1. Large ulcerating lesion on the lesser curvature near the pylorus.

Myosarcoma is difficult to distinguish from spindle cell and round cell sarcoma, though the latter are encountered more frequently. Ewing<sup>1</sup> says that about 1 per cent of gastric malignancies are sarcomata while Fenwick<sup>2</sup> places the percentage a little higher.

The etiology, pathology and clinical aspects of myosarcoma have been discussed adequately by Gaber, Tufts and Witte<sup>3</sup> and Edwards and Wright<sup>4</sup> have reviewed the literature up to 1933 and found reports of 38 cases. Gaber, Tufts and Witte<sup>3</sup> report one case with recovery following operation.

Myosarcomata of the stomach usually arise from the curvatures and often project into the peritoneum as solitary solid tumors and cystic tumors and may attain enor-

"endogastric" forms are usually also pedunculated.

The structure of the myosarcoma varies; sometimes the cells are distinctly muscular in type, while in other cases the predominant cell may be of the large spindle cell variety. Sometimes there is a mixture of cells.

The following case is reported because of the rarity of the tumor and also because of the few symptoms which the patient presented, namely, marked anemia and slight indigestion.

J. G. J., aged thirty-one years, American, was admitted to the Memorial Hospital on February 3, 1936, complaining of pallor, fatigue and indigestion. The present illness dates back ten

years when the patient became conscious of increasing pallor. This was the only symptom noticed until about two months ago when the

white blood cells numbered 7550; 75 per cent of which were polymorphonuclears, 1 per cent were basophiles, 26 per cent were small lymphocytes



FIG. 2. Posterior Polya type of operation.

patient noticed acute pains in the epigastrium following meals. The history is interesting due to the fact that it is almost entirely negative except for the increasing pallor and slight fatigue on exertion. The appetite has always been good. The bowels moved regularly twice daily. There had been no loss in weight, vomiting, hematemesis or melena.

The past history was negative except for the usual childhood diseases and malaria in 1920. There were no previous operations. The family history was essentially negative.

Physical examination revealed a well developed white male of about the stated age of thirty-one years. There was a marked pallor of the skin. The physical examination was negative except for a marked pallor. The blood pressure reading was 110 systolic and 70 diastolic. There was slight tenderness on pressure in the epigastrium but no rigidity, masses nor scars. On admission the red blood cells numbered 1,390,000 and the hemoglobin was 35 per cent. There was a marked achromia, a moderate anisocytosis and an occasional poikilocyte. The



FIG. 3. Resected specimen consists of about four-fifths of the stomach and shows a large calloused, malignant ulceration.

and 5 per cent were metamyelocytes. The urea nitrogen was 18 mgs. per 100 c.c. The blood chlorides were .537 per cent. The urine examination was negative.

The x-ray revealed a large ulcerating lesion on the lesser curvature of the stomach near the pylorus (Fig. 1).

Four transfusions of whole blood by the multiple syringe method were given on four successive days, totaling 2310 c.c. The red blood count following these transfusions was 4,000,000 with 74 per cent hemoglobin.

The abdomen was opened on February 7, 1936, under ethylene and ether anesthesia, through an upper left rectus incision. On examination of the stomach a large ulcerating growth was found on the lesser curvature of the stomach near the pylorus with evidence of glandular involvement in the immediate area. There was an attachment to the pancreas so that resection of the pylorus had to be more extensive than usual. About four-fifths of the stomach was removed and a posterior Polya anastomosis was done, joining the side of the jejunum to the end of the stomach (Fig. 2).



Grossly, (Fig. 3), there was a large, dollar sized crater lesion on the lesser curvature of the stomach about 2 cm. from the pylorus. The

toms except those from a secondary anemia. Any case with an unexplained anemia should have a fluoroscopic examination

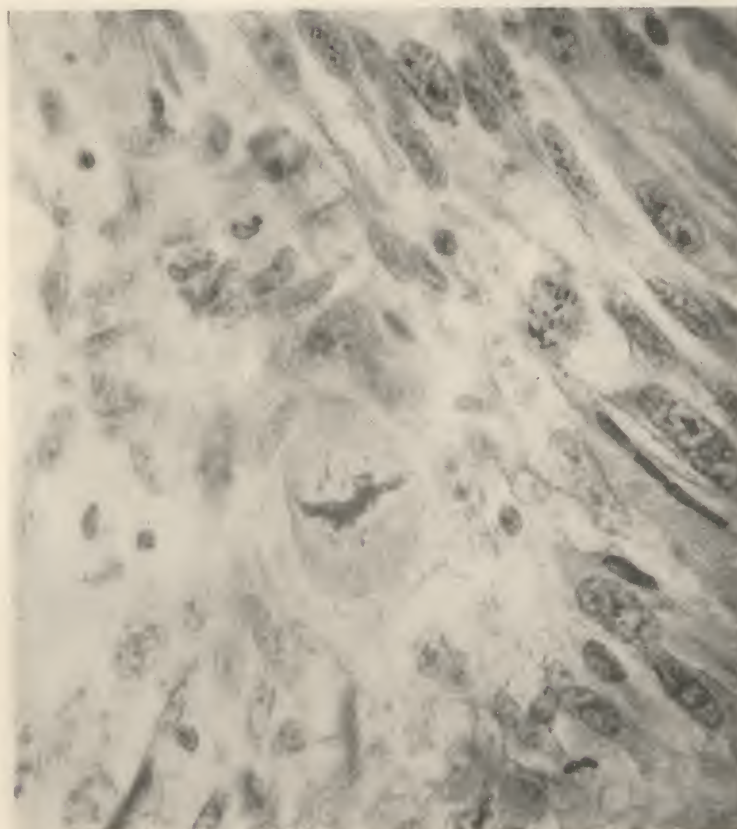


FIG. 4. Photomicrograph shows the myosarcomatous nature of the growth.

walls of the lesion were markedly raised and considerably infiltrated. Opposite the base of the crater there were several large glands forming a conglomerate-like mass about 4 cm. in diameter.

Microscopically, (Fig. 4), the entire wall of the stomach and the glandular mass were made up of densely packed, very large spindle shaped cells having fairly long fibrils. There were a number of mytotic figures. No epithelial cells were found. A pathological diagnosis of myosarcoma, grade iv malignancy, was made.

The patient made an uneventful recovery and was dismissed from the hospital February 18, 1936, fifteen days following admission and eleven days following operation. At the present time the patient is in good health and has returned to his work in the oil fields.

#### CONCLUSION

A case of myosarcoma of the stomach is reported. There were practically no symp-

made of the stomach to exclude ulcerating or polypoid lesions. Lesions of the right colon will likewise cause a severe secondary anemia.

The adequacy of radical resection for malignancies in the stomach has been shown a number of times. We are hopeful that this patient will be cured, however, if palliation only has been afforded it will be quite worthwhile.

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# A Case of Peptic Esophagitis

By

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**B**ENIGN ulceration of the esophagus is rarely diagnosed because the clinical picture is not well defined, it usually produces no definite Roentgen-ray findings, and esophagoscopy examinations are not often made. The following case demonstrates the diagnostic difficulties seen in these cases, throws some light on etiology, and presents therapeutic problems which are as yet unsolved.

The patient, the wife of a physician, was aged 56 when first seen in November, 1934. She gave a life long story of intermittent indigestion of a vague type, the trouble gradually growing worse during the past two or three years. At one time a diagnosis of gastric ulcer had been made after an X-ray examination, and she was known to have diverticulosis of the colon. In addition there had been sick headaches associated with the gastric complaint.

In spite of the fact that her complaint in recent years had been of difficult and painful swallowing, several roentgenologists had carefully examined her stomach and intestines without ever looking at the esophagus until in August, 1934, at which time an X-ray examination disclosed obstruction of the lower portion of the esophagus. Esophagoscopy examination proved this to be due to an annular ulcer two inches above the cardia. The tissue removed by biopsy was diagnosed as inflammatory by two different laboratories.

At the time we first saw the patient, she was suffering intense paroxysms of pain following attempts to swallow either solids or liquids. The pain usually lasted from several hours to eighteen hours and was so intense that morphine was often given though with little benefit. At times chloroform anesthesia had been induced to give relief. The difficulty was intermittent, the severe paroxysms occurring about once a day. A bismuth and phenol mixture had helped to prevent pain and had enabled her to take sufficient liquids to avoid dehydration. Under the fluoroscope, the upper three-fourths of the esophagus was seen to be dilated. About two and one-half inches above the cardia there was a smooth, tight stricture which looked as though a string had been tied around the esophagus at this point. After a few minutes the barium mixture began to seep through the stricture, outlining a seemingly normal lower esophagus. Examination of the stomach showed many reverse peristaltic waves, rippling up over the stomach and carrying barium back up the esophagus as far as the point of stricture. An hour glass constriction was present in the lower one-third of the stomach, but no indication of ulceration was made out. Administration of three-eighths grain of ephedrine hypodermically caused a perceptible relaxation of the esophageal stricture and relief of pain.

For a few days, the patient seemed to derive considerable benefit from treatment consisting of three-eighths grain ephedrine and three-fourths grain amygdalin three times a day, alkaline powders and frequent bland feedings. Mucin was used at bed time with the idea of providing a coating for the ulcerated area.

Symptoms again became aggravated after a short time. Esophagoscopy examination was then made under general anesthesia. The dilated upper esophagus was found to contain a large amount of food debris, although food had been withheld for more than twenty-four hours. The mucosa was boggy with edema, just as one commonly sees it in cases of stasis due to malignant stricture. The area of stricture itself was seen to be ulcerated and bleeding. Several pieces of tissue were removed for examination and the whole area painted with silver nitrate. It was impossible to pass the dilator through the stricture. The specimens were examined at Mayo Clinic and found to be inflammatory tissue.

Following this, there was improvement for several weeks. One month later it was possible to pass an esophagoscope through the stricture and the annular ulceration was discovered to extend from the stricture practically down to the cardia. Relief of stasis had permitted the mucous membrane of the upper esophagus to return to a normal condition. Under the fluoroscope, spasm appeared to be much less marked but there was still considerable narrowing.

After a short interval of improvement, difficulty in swallowing again became aggravated. Larostidan therapy was tried. The drug was given intramuscularly in dosage of 5 c.c. on alternate days for six doses but there was no improvement and the treatment was discontinued.

Since the patient was now becoming dehydrated and she was unwilling to tolerate wearing a nasal tube for feeding, gastrostomy was performed on February 19, 1936, with the idea of subsequently being able to carry out retrograde dilation of the stricture. Exploration revealed no involvement around the cardia and no evidence of an infiltrating growth.

A formula was prepared consisting of milk, cream, egg, Karo syrup, yeast, cod liver oil, liver extract, pureed vegetables, and orange juice, and this mixture was administered through the gastrostomy at hourly intervals. The gastric content was tested before each feeding and sufficient alkali was given to entirely neutralize any free acid which appeared. Paroxysmal pain, however, still continued to occur and was associated with the regurgitation of food into the esophagus from which it was often vomited. Prompt relief of pain followed vomiting food or emptying the



stomach by aspiration. It was soon found that orange juice induced an attack of pain but no other ingredient of the formula could be incriminated.

Subsequently the stricture was dilated at weekly or bi-weekly intervals up to a size 40 French dilator. There was never complete freedom from the difficulty in swallowing, but after a few months, the gastrostomy was allowed to close.

In September, 1936, a cycle of migrainous headaches began and concomitantly there was increased trouble in the esophagus. Subsequently it was discovered that she had become allergic to eggs and milk. After the omission of these foods, her headaches and pain were relieved and the paroxysms were lessened.

Our interpretation of the sequence of events in this case is as follows:

The woman was an allergic individual with definite sensitization to milk, eggs, oranges, and possibly other foods. On ingesting these foods, she developed a functional disturbance of the gastro-intestinal tract, and as a part of this disturbance, she had reverse peristalsis in the stomach and up the esophagus as demonstrated repeatedly both under the fluoroscope and by observation during the time she was being fed through the gastrostomy. These waves carried acid gastric contents up into the esophagus where eventually a peptic esophagitis resulted. Spasm from irritation, together with narrowing from the scarring produced obstruction which became complete only when spasm was marked. Dilation of the esophagus above the point of stricture resulted from the retention there of food and liquid. Stasis lead to edema and changes in the mucosa of the upper esophagus. The condition differs from the ulceration seen in cardiospasm in that the ulceration in this case lies distal, not proximal, to the obstruction.

In the treatment of this case, we have attempted to keep the organic stricture dilated and have tried futilely to keep the gastric contents neutralized in order to allow the ulceration to heal. The real need, however, is to stop the reverse peristalsis which is keeping the esophageal mucosa bathed with acid chyme and this has not been satisfactorily accomplished.

Jackson (1) reported twenty-one instances of ulcer in over 4000 cases subjected to esophagoscopy examination, an incidence of about 0.5%, and found scars of healed ulcers in an additional 1.7%. This incidence may be too low for esophagitis was found to be present in 7% of over 3000 cases which were examined at post mortem at the Mayo Clinic as reported by Butt and Vinson (2). Of these, 76.5% were acute and only 1.5% chronic lesions. They make the significant observation that 46% of all cases had vomited or had had gastric lavage prior to death. In other words there was evidence of retrograde flow of gastric content through the esophagus in about one-half of these cases with acute esophageal inflammation. Jackson also considers gastric reflux to be a characteristic of such cases.

There are many causes for back-flow into the esophagus; i. e. post-operative nausea, hour glass stomach, peptic ulceration of stomach or duodenum with pylorospasm, pyloric obstruction, etc. In our case, we believe the reflux was on an allergic basis.

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## Severe Hemorrhage of Peptic Ulcer Origin

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## SEVERE HEMORRHAGE OF PEPTIC ULCER ORIGIN

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IT has been the opinion of many that severe hemorrhage from peptic ulcer is not common and that death from this cause is unusual. My interest in this problem was aroused by observing within the past year five cases of severe hemorrhage with two deaths. In reviewing the literature it is found that bleeding from peptic ulcer occurs in a very high percentage of cases. Balfour reported bleeding in 25 per cent of all patients with duodenal ulcer followed over a period of ten years.

Goldman in the study of a large series of cases found that 38 per cent of his patients with peptic ulcer entered the hospital on account of gross hemorrhage or developed it while in the hospital. Of this number 11.1 per cent died of exsanguination, an additional 4.9 per cent had bleeding and another complication as a cause of death, bringing the total mortality to 15 per cent. Crohn estimates that severe or gross hemorrhage occurs in 10 per cent of ambulatory cases and in about 25 per cent of hospital cases.

Undoubtedly, there are many cases of mild hemorrhage which cause no particular concern and consequently do not require the patient to be taken to the hospital. The concentration of severe cases in the hospital leads to the high percentage of fatality in hospitalized cases. One treating the average run of ulcers will probably not see many severe hemorrhages. It has been reported that about seven tenths of the hemorrhages occur after the age of 40 and that death is uncommon before this age. Death is more common after 40 because with advancing years sclerosis of the blood vessels increases, so that a blood vessel once eroded into is held open by the atheromatous change.

Some feel that all cases of severe gastric hemorrhage should be treated expectantly. Realizing that death does occur more frequently than supposed, direct surgical attack in selected cases may prevent a fatality.

It has always been good surgical practice in cases of hemorrhage elsewhere to endeavor promptly to stop the bleeding, but in hemorrhage from peptic ulcer a hands-off attitude has been too often pursued. One of the reasons for this is that an anatomic diagnosis is imperative before undertaking such a major surgical procedure. However, ulcer is the cause of the highest percentage of gastric hemorrhage. Bulmer reports 89 per cent of severe gastric hemor-



rhages due to ulcer, the rest being due mostly to cirrhosis of the liver or carcinoma.

Finsterer believes in early operation in the first 24 to 48 hours in all cases of severe gastric hemorrhage. In 1933 he illustrated the importance by analysis of forty-six cases of early operation and fifty cases of late operation in which the mortality was 4.3 per cent and 32.7 respectively. The mortality of 2.5 per cent under medical treatment includes all cases, most of which were only mild. These figures are striking, yet I am sure that if such radicalism were followed by less experienced surgeons, the mortality would be much higher than with medical treatment.

Lahey states that hemorrhage in patients with gastric or duodenal ulcer, exclusive of perforation is by far the most serious aspect of this condition. This is true also from the point of view of fatalities as proved by the fact that in 5 per cent of all the ulcers in his experience which bled while in the hospital died in spite of everything that could be done for them.

Bleeding is serious too from the point of view of the mechanism of its occurrence. The ulcer that bleeds severely is the one that is located on the posterior wall of the stomach or duodenum and in perforating onto the pancreas has eroded a large artery. Moreover the process has usually been going on for a long time causing a good deal of scarring of the duodenum with shortening. Direct attack is therefore a tedious operation. However, when severe bleeding is going on, particularly in an individual past 40, and the situation is becoming desperate, with a large transfusion by multiple portals, perfection in surgical technic and team work one can save some of these individuals who would otherwise bleed to death. Nothing short of a direct attack on the ulcer will offer very good results and the operation of partial gastrectomy and duodenectomy will be the operation of necessity. The risk of the operation will be increased by delay or by intermittent hemorrhage. If a patient gets by a large hemorrhage, it is usually best to wait for a week or ten days before operating. Two things can be accomplished by this. The general condition of the patient can be improved by transfusion and fluids, and the acute condition around the ulcer may subside to some extent so that direct attack on the ulcer can be carried out more safely. If bleeding should recur during this period operation should be undertaken promptly.

#### REPORT OF CASES

CASE 1. A white man, aged 54, came to us in December, 1936, with severe hemorrhage from a duodenal ulcer. The patient continued to bleed in spite of all medical means. He was kept from exsanguination by repeated large



transfusions and we knew he would die unless the bleeding was controlled. Exploration through a high right rectus incision revealed a perforating duodenal ulcer. The duodenum was markedly scarred and shortened: this in a short stocky individual increased the technical difficulties. The small bowel and colon were filled with old blood. When the duodenum was opened, bright red blood welled up in the field. There was a large ulcer on the posterior wall which was cauterized by the electro-surgical unit. A piece of iodoform gauze was packed and sutured into the crater. In addition there was active bleeding from the mucous membrane from almost the entire circumference of the duodenum. The cap of the duodenum with the anterior two thirds of the pyloric sphincter was excised and the opening was closed as a gastro-duodenostomy. The duodenum was narrowed to such an extent that a posterior gastro-enterostomy was necessary. The patient was given 1,000 c.c. of blood just before the operation and about 600 c.c. of blood before leaving the operating table. His blood pressure at the close of the operation was 120 systolic. However he continued to bleed and succumbed from hemorrhage about twelve hours later. He was a very obese individual so that operation was difficult at best. The duodenum was inaccessible. Even though these things were true, partial gastrectomy and duodenectomy would not have been any more difficult and would have been a better operation. Had that been done the result might have been different.

CASE 2. A white man, aged 53, was admitted to a local hospital Nov. 26, 1937, having experienced a large hemorrhage the day before. He had been operated upon two years previously by his physician for acute perforation of a duodenal ulcer. Following that he enjoyed fair health until June, 1937. Since then he had had a great deal of stomach distress. On admission his red blood count was 2,000,000; the hemoglobin was 50 per cent; the pulse and blood pressure were normal, so we felt watchful waiting advisable. The following morning the patient was feeling well; at 1 o'clock he had no complaints; during the afternoon he felt a little faint and at 4 o'clock he was found in extremis vomiting bright red blood. He died before the intern could get to the bed. Postmortem examination revealed the pyloric end of the stomach to be densely adherent to the abdominal wall; an anterior pyloric ulcer had perforated onto the abdominal wall. The vessels along the pancreas were very sclerotic. This patient could probably have been saved by transfusion and operation on admission.

CASE 3. A Jew, aged 38, came to us in February, 1937. He had had a slight amount of discomfort for the past two years. The distress was characteristically that of peptic ulcer but never very severe. In the past year and a half he had had four hemorrhages, the last one being so severe that transfusion was required. He stayed in the hospital for a period of ten days. He got along nicely after his last hemorrhage and since he was feeling so well he declined operation, although it was strongly urged. He had no trouble for another year at which time he had another small hemorrhage. This man unquestionably should be operated upon.

CASE 5. A white man, aged 52, came to us in December, 1936. He had had a history of duodenal ulcer for a number of years. He continued to pass black tarry stools for several days. He received multiple transfusions and had to be kept in the hospital for a long time. Operation was advised after his general condition improved, but he declined. Today his ulcer symptoms are controlled medically and he has had no further hemorrhage.



CASE 6. A white man, aged 51, was admitted to the hospital Sept. 9, 1937, with a three year history of stomach trouble, not definitely related to food. He had suffered his present attack a little over two weeks. He had been passing tarry stools. His blood count was 1,500,000. There was no bleeding on admission. A few days after multiple transfusions he was operated on. A subacute perforating bleeding duodenal ulcer was found. The stomach appeared normal. The gallbladder was thin-walled and normal to palpation. About four fifths of the stomach was removed, the operation being completed as a posterior Polya. A good anastomosis was obtained and the closure of the duodenal stump was satisfactory, although there was a good deal of edema of the tissues. Four months later the patient appeared normal. He had gained weight and looked well. The anemia had been entirely overcome. A second hemorrhage probably would have proved fatal.

One hundred twenty-six patients were admitted to the Memorial Hospital with peptic ulcer during a four year period from 1934 through 1937. Only thirty-three of these were admitted because of hemorrhage. The hemorrhage was mild in twenty-one of the cases; moderate in three and severe in nine. All of the cases that had a mild or moderate hemorrhage, promptly recovered under medical treatment. In two of the severe cases direct surgical attack was felt advisable. These cases are reported in detail (Case 1 and 5). There was only one death from hemorrhage in this group of thirty-three.

In dealing with hemorrhage from a peptic ulcer we must realize that most of the patients will survive bleeding. Each must be handled individually. Certainly medical and surgical procedures are not competitive. Cooperation is most essential in dealing with this group of individuals. Most of them can be handled medically. In the individual whose life is endangered by exsanguination or in an individual who has had one hemorrhage and in a day or two has another, surgery should not be delayed. This is particularly true if the patient is over 40 years of age.



## Present-Day Management of Lung Abscess Report of Two Illustrative Cases

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**A**BSCCESS of the lung may be single or multiple. The majority, by far, are found in the right lower lobe; the next most frequent site of occurrence is in the left lower lobe. As to their etiology, two schools of thought have been formulated; (1) those who believe abscess to be inspiratory in origin, and (2) those who believe them to be embolic. Both are correct and will account for the occurrence of the majority of pulmonary abscesses; in addition, they may arise from lymphatic extension, or they may, in a few cases, be the result of trauma externally. In support of the first theory, Richardson in 1912 reported the first cases of post-tonsillectomy abscesses, and later, Lord ascribed 34.3 per cent of his series of 227 cases to the result of this method of onset. Adding still more evidence to the inspiratory theory, Moore analyzed 202 cases in which he found that 41 per cent of the abscesses were in the right lower lobe and 19 per cent in the left lower lobe. Again, in the cases reported by Graham and Singer, 40 per cent of a series of 34 occurred in the right lower lobe, and Heuer, in a series of 42 cases found the abscesses of 21 in the right lower lobe. As early as 1913 Norris and Landis realized the importance of pneumonia as a causative agent, and they reported such pneumonic origin in 37 of a series of 100 cases. Chevalier Jackson repeatedly emphasized the necessity of considering foreign bodies as etiologic agents especially in children. Moreover, one may refer to the fine experimental evidence in favor of the embolic theory of such men as Fetterolf and Fox, Cutler, Schlueter, Holman, and Weilein. Therefore, we have come to find that the location of lung abscesses is dependent on the nature of its origin, as further shown in the following series of cases of Walker and Moore:

	Upper lobe	Lower lobe	Middle lobe
Post-operative	18	9	1
Post-pneumonic	24	44	3

The following cases are reported as being of the post-pneumonic and post-operative

groups respectively. They were selected because they exemplify the whole gamut of treatment, and because they illustrate how costly a comparatively simple error of judgment might be.

*Case 1:* This little girl, M. L. C., aged 5, was admitted 7/2/34 to the hospital with a dull constant pain in the right lumbar area. After confirming the diagnosis, she was subjected to appendectomy under ethylene anesthesia. The flat-plate roentgenograms of the chest and abdomen were reported negative pre-operatively. By the fourth post-operative day, she had begun to cough and there was x-ray evidence of a definite pneumonic area over the right base. Temperature gradually fell to normal by the tenth day, but there was a persistent greenish foul sputum. She was discharged from the hospital on the twelfth day to continue treatment at home.

*Postural drainage:* Within two weeks, x-ray showed the abscess definitely and her doctor placed her on postural drainage. Fever continued from 99 to 101° F. and after poor results from this therapy she was referred for bronchoscopic drainage.

*Bronchoscopy:* This was continued at intervals of two weeks for six weeks, but the x-ray showed extension of the original process.

*Phrenicectomy:* This was performed 11/20/34 under local anesthesia in an effort to stop the pneumonic spread. There was no apparent decrease in the size of the cavity from this treatment.

*Artificial pneumothorax:* This was the costliest error of all. She was given three of four refills of air into the right pleural cavity, but developed sudden pain and dyspnea with a resultant secondary empyema.

*Closed drainage:* This was performed after readmission to the hospital 1/3/35. Her post-operative course was stormy, drainage from the wound was abundant, but her cough was increasing. Five transfusions were given totaling 1300 c.c. of whole blood which brought her red cell count to 4.41 million.



*Open drainage with secondary operation:*

This was performed in an attempt to drain the abscess, but the drainage tubes only entered the pleural cavity. After one month, the tubes were removed while the drainage was still abundant and secondary incision and introduction of the tube was necessary. X-ray showed an empyema pocket and small multiple lung abscesses. At this time, one of us was called as consultant.

*Thoracoplasty:* In addition to the abscess, this patient now had an empyema which needed treatment. Thoracoplasty in two stages was performed beginning with the first stage 4/29/35 and finishing one week later. The lower angle of the wound was packed open without suture to facilitate later approach to the lung. X-ray showed good collapse with obliteration of the empyema and her general condition improved as manifested by reduction of fever and cough and gain in weight.

*Cautery lobectomy:* This was performed under ethylene anesthesia 5/30/35 by saucerizing the right lower lobe in two stages. She responded well after the first operation, but after skin flaps were dissected in the second, apnea developed with cyanosis and the anesthesiologist was unable to revive her. She expired 7/30/35 on the verge of cure. She had had close to thirty transfusions during her illness. Autopsy showed obliteration of the empyema pocket and all the abscesses except one small bronchiectatic pocket measuring 2 cm. in diameter. Death had resulted from asphyxia, as these patients do not tolerate cyanosis.

\* \* \* \* \*

*Case 2:* In presenting this case, only the high points will be touched as it parallels the preceding case in some respects. This little girl, J. C., aged 7, developed a post-tonsillectomy pulmonary abscess in the left lower lobe 10/1/37. It was not diagnosed until 10/30/37 when she was placed at once on postural drainage. After one month when response was not deemed sufficient, bronchoscopic drainage was employed and repeated every two weeks for two months. Introduction of opaque oil in the bronchial tree at this time revealed a few smaller bronchiectatic abscesses in addition to the now-smaller original abscess. Without warning, on 3/13/38 she had a massive pulmonary hemorrhage and phre-

nectomy (temporary) was performed the following day in an attempt to control it. After two transfusions her general condition had improved remarkably.

*Excision lobectomy:* On 4/10/38 she was subjected to excision lobectomy of the left lower lobe. After removal of the lung, it was noted that the hemorrhage had come from a large branch of the left pulmonary vein. Convalescence was uneventful, the wound healed per primum and she was discharged from the hospital asymptomatic 5/25/38.

*Discussion:* The treatment of acute abscesses differs greatly from chronic ones. Any abscess which dates back no longer than 8 to 12 weeks may be termed acute. It is estimated that 25 per cent are cured by merely rest and postural drainage. The results here are certainly better from hilar abscesses than peripheral ones due to the more direct path of exit for the pus. Drugs have also been used to allay the spirochetal forms of infection and neoarsphenamine is probably the most noteworthy, however it is not curative for the abscess. Vaccine and roentgen therapy have both had their advocates, but are for the most part undependable.

When rest and postural drainage fail, and within a reasonably short period of time, bronchoscopy should be tried. It will, of course, be more effective in single abscesses and especially those located centrally. There are many other advantages in bronchoscopy according to Graham, Singer and Ballou: (1) it helps to rule out foreign body, (2) it excludes new growths, (3) it reveals bronchial stenosis, and (4) it reveals the nature of the surrounding pulmonary tissue.

Pneumothorax may be tried if the abscess is a hilar one, but as in the first case reported, rupture of the abscess is nearly bound to occur if peripheral. Low pressure should be used to prevent rupture and to prevent spread into other parts of the lung by shutting off bronchial drainage, or by compression of adjacent tissue. There is always the danger of air embolism, spontaneous pneumothorax, and the delays encountered in its administration, if it fails when surgical drainage could be effectively administered. Never use pneumothorax in extensive abscess formation due to the dangers of pulmonary gangrene. The results of pneumothorax are variable.



Whittemore and Balboni reported 18 cases of whom 7 died; Goldberg and Bluementhal had 16 cases and 2 died; Tewksbury reported 35 cases and 4 deaths (all his cases were under 6 weeks duration).

Surgical measures are used when the foregoing conservative measures fail. Thus surgery is adopted for this chronic abscess and in such acute cases where we suspect (1) the presence of ruptured putrid abscess with empyema, (2) any unruptured putrid abscess, (3) abscess with undue hemorrhage.

The surgical treatment of choice after medical regime including bronchoscopy has failed is pneumonotomy or surgical drainage. This is most frequently afforded by a two-stage method in which the first stage is a simple thoracotomy for insuring adhesion formation between the lung and the chest wall. Gauze packs or other plumbage material is used to pack into the wound. The time to undertake surgical drainage is after the abscess has formed a definite delimiting pyogenic membrane, thus insuring a safe localization, which certainly should have occurred by the 8th week or sooner. It is well to give medical treatment at least 12 weeks to accomplish what it will. The mortality of surgical drainage is high but will vary with the age. Lilienthal in 1928 showed a mortality of 42 per cent under 50 years and 63 per cent above 50. Muller's figures were 18.5 per cent and 62 per cent respectively for the same age limitation.

Phrenicectomy is used as an adjunct to other surgical measures but rarely alone. Moore reported 10 cases in which 4 were improved, 3 slightly improved, 2 dead and 1 other came to thoracoplasty and cauterary pneumonectomy. Thoracoplasty should never be used for uncomplicated lung abscess. Thoracoplasty is the treatment for empyema complicating lung abscess and may be aided considerably by a phrenic interruption.

In empyema the treatment should be pointed for the empyema and if the abscess is single, it should clear up simultaneously, e.g. by collapse. Some form of collapse therapy is desirable and the most effective is an extra-pleural thoracoplasty in multiple stages. This may be combined with thoracostomy which should have been done beforehand. This may be aided by a phrenic interruption, although

Lilienthal believes there is little benefit from a phrenicectomy due to the thick exudate which may immobilize the diaphragm. Keller showed only a 7.5 per cent mortality in a series of 40 such cases because he kept open drainage through all the operative procedures, and although he had to resort to extensive scarification (including periosteum) of the pleura over the residual cavities. Collapse procedures should not be delayed long due to the imminent danger of brain abscess following a prolonged empyema. If there are multiple abscesses, the chances for return of function of that lung are slight and cauterary pneumonectomy should follow the last stage thoracoplasty. Usually the results from a single cauterization covering a wide saucer-shaped area would be sufficient to encourage drainage. The only complications are hemorrhage and broncho-cutaneous fistula, either of which rarely become enough of a menace to hazard to patient's welfare. If there is a residual pulmonary suppuration, a second or third cauterization may become necessary (or a sufficient number of times as seem expedient with cure) waiting about four to six weeks for an interval. Whenever the condition of the patient did not warrant extensive collapse measures, Lilienthal would institute open drainage and lavage daily with Dakin's solution. The quantity of drainage should be measured daily and lipiodol may be instilled to obtain an idea of the size of the residual cavity. When the cough and sputum are allayed and the anemia combated, more extensive collapse therapy may be then considered.

### *Conclusion*

It was not the purpose of this paper to discuss details of operative technique, but rather to recapitulate briefly the present day modes of therapy in pulmonary abscess. Two cases are herein reported illustrating almost every phase of treatment afforded in lung abscess, calling attention to the errors of judgement in the treatment of each case. Approximately 25 per cent of cases of pulmonary abscess will clear up with rest and postural drainage alone. The rest must come to bronchoscopy before attempting collapse therapy. The most effective surgical treatment is pneumonotomy for the chronic abs-



cess. When empyema complicates pulmonary abscess, it usually becomes necessary to utilize major collapse measures; this is preferably thoracoplasty. It may become necessary to follow collapse by cauterization of the remainder of the necrotic lung.

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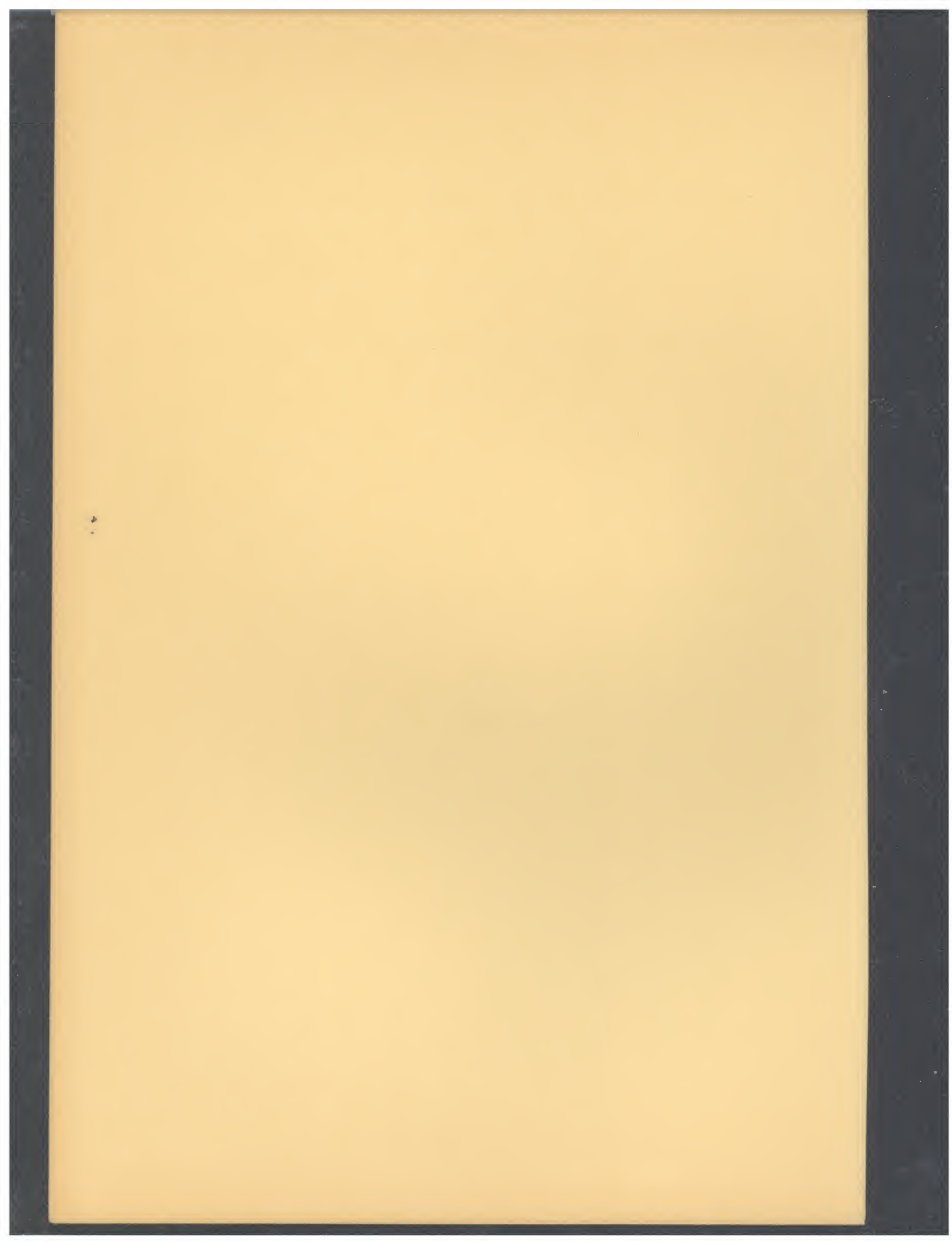
# Surgical Treatment of Pulmonary Tuberculosis

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## Surgical Treatment of Pulmonary Tuberculosis\*

John Roberts Phillips, M.D., Houston, Texas

The field of thoracic surgery has made great advances in the last few years. Better selection of cases, refinement in technique, better understanding of anesthesia, and combined medical and surgical judgment, has lowered this mortality materially. Surgical collapse for pulmonary tuberculosis has gained markedly in favor, and now, in many of the larger centers, collapse procedures are carried on daily.

The simplest and most effective method of obtaining complete collapse is by pneumothorax. This measure is usually handled by the internist and chest specialist. Very often, either no collapse can be accomplished or collapse is inadequate, due to an old process of the disease in which adhesions have occurred which hold the lung to the chest wall.

Three of the most commonly used surgical procedures will be discussed briefly: The simplest surgical procedure is that of phrenic nerve interruption. This procedure is relatively new, the first operation having been done in 1911. It has a definite place in many cases of tuberculosis as well as in many chest and abdominal conditions. It will often afford, through elevation of the diaphragm, a thirty per cent pulmonary collapse on that side. It works most effectively in basal lesions and in centrally located cavities. However, apical lesions may be markedly benefited by this procedure. In some clinics minimal apical lesions are treated by rest and temporary phrenic nerve interruption rather than a pneumothorax. Pulmonary hemorrhage may be controlled by it in some cases in which no air can be given. A temporary nerve interruption should always be carried out first because in dealing with bilateral disease one may find at some time during the course of the disease that the worst lung may eventually become the better one.

At times a temporary procedure should be carried out as often as four or five times before it becomes necessary or advisable to make the procedure a permanent one. There is practically always an accessory phrenic branch, and unless this is recognized and removed, elevation in the diaphragm will not be as complete as one would like. Paralysis from temporary phrenic interruption should last from three to six months. The operation

can be done with practically no risk, and it is surprising to see how quickly some of these critically ill patients will begin to improve after this procedure.

Inadequate collapse of the lung by pneumothorax is a very frequent thing. It occurs in about sixty per cent of the cases. It is not advisable to carry on inadequate collapse indefinitely. Neither is it advisable to try to stretch out all adhesions, because serious damage may come by tearing pulmonary tissue, and a spontaneous pneumothorax or a tuberculous empyema may result. To facilitate better collapse the dividing of pulmonary adhesions, or pneumolysis, can often be carried out. We used to believe that before making a thoracoscopic examination to determine if pulmonary adhesions could be severed or not, that one should wait from three to six months after pneumothorax institution, but now we believe that by waiting this long the walls of the cavity may become so thickened that after severance of the adhesions, the cavity may still remain open because of the firmness of the wall, and, of course, during the waiting spread may take place to the other side. I believe in early severance of adhesions if advisable. The most suitable ones for cutting are the string, cord, or fan-shaped types. One must be very careful that lung tissue is not pulled out into the adhesions, for if lung tissue is cut into, an empyema of mixed type will almost certainly result. A serous effusion frequently follows the cutting of adhesions, but often times this is only minimum and not hard to control. One is not surprised to see the reason for a tuberculous empyema, for in many of these thoracoscopic examinations, tubercles can be seen on the visceral or parietal pleura. The frequency with which these operations are carried out is shown by a recent report by a member of the Association of Thoracic Surgeons at Saranac Lake, in which he reported over 250 cases without a death, and in only two cases was there serious enough hemorrhage to require an open operation. Interstitial emphysema frequently follows the procedure but usually is of no concern.

The operation of open pneumolysis has practically been abandoned since the introduction of the closed method. It is a procedure that carries a much greater mortality and a much higher instance of empyema.

\*Read before the Harris County Medical Society.



Cases of open cavities in which an adequate pneumothorax is not obtained, can be handled by thoracoplasty or an extrapleural pneumolysis. The number of thoracoplasties that are being done throughout the country are rapidly increasing. The mortality is decreasing. This is due to the fact that now multiple stages are almost universally carried out. It is unusual to remove more than two and one-half ribs at one sitting. To carry out a selective collapse of the upper part of the lung, in which it is usually advisable to remove about seven ribs, will require about three stages. In cases of very extensive disease, of course, a total thoracoplasty will be necessary. It is important to remove long segments of the ribs with the tips of the transverse processes, for if the transverse processes are not removed, frequently a cavity will be crowded into the posterior gutter, and closure of the cavity will not be accomplished. It is very important that all cavities be closed as rapidly as possible, for not only is there a great danger of the spread of the disease, but there is also a great danger to the community for one to be subjected to a patient who has an open cavity. It is known that unless a cavity is closed, that ninety per cent of the individuals harboring them will be dead within a period of five years. One of the best studies that I have seen in regard to thoracoplasty was made by Freedlander and Wolpaw. They studied 153 patients on whom thoracoplasty was recommended. All recommendations were made at conference and no idea was known as to whether the patient would accept operation or not. Of this number, 85 accepted operation and 58 refused. The same facilities for sanitarium care were available to every patient regardless of group. It makes the study most valuable.

Sixty-six per cent of the 85 thoracoplasties had closed cavities or improved, while only 17 per cent of the 58 refusals showed this result; 21 per cent of the thoracoplasty group were worse or dead, where 61 per cent of the refusal group were worse or dead.

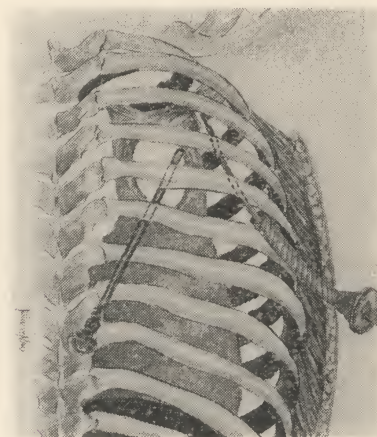


Fig. 1.—Closed pneumolysis. An inadequate pneumothorax due to adhesion from the lung to the chest wall is shown. Partial division of the adhesion is being carried out under vision through the thoracoscope.

Some very far advanced cases with cavities will continue to run a fever in spite of strict rest, but may improve and become fever free after their first stage of thoracoplasty. In cases of bilateral disease, bilateral selective thoracoplasty will often relieve the situation. There is a great need for stimulation of enthusiasm and development of this field of surgery in the South. If one could travel over the country and see the accomplishments that are being attained, one would have no hesitancy in recommending and urging surgical collapse in properly selected cases.

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## Control of Syphilis in Tuberculosis

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## CONTROL OF SYPHILIS IN TUBERCULOSIS\*

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Since Voegtlin definitely demonstrated that trypanosomes were killed *in vitro* by oxidation of the arsphenamines in high dilutions, a number of effective products for clinical use have been produced. It has been determined that there is a definite latent period after injection of an arsphenamine before it is oxidized to produce the spirocheticidal agent. Too rapid oxidation leads to the liberation of small amounts of a toxic arsenoxide; this variation of absorption, hence, rate of oxidation, varies with the individual and is unfortunately uncontrollable. Such toxic effects have been repeatedly felt as detrimental to individuals afflicted with pulmonary tuberculosis, to say nothing of the uncomplicated syphilitic.

It was advisable, therefore, that one employ a drug which would possess properties of the arsphenamines, but would possess in addition a slower rate of absorption. Meta-amino parahydroxyphenyl arsine oxide† answers these qualifications; it has, in addition, the advantage that no neutralization is required, and it is easily excreted. It has been employed in a large series of patients elsewhere, but there are little or no data available as to its efficacy in patients with tuberculosis and syphilis. It is a trivalent arsenical which may be prepared in a stable crystalline form. The crystals are white, but darken with moisture. The aqueous solution may be boiled for one minute without appreciable change in therapeutic value or toxicity. Chemically, its formula is closely related to that of arsphenamine.

A considerable amount of clinical data has

been reported by a number of workers, particularly Foerster *et al.*, and Tatum and Cooper. It was found that 64 to 78 per cent of the drug is excreted six days after administration, and that its trypanosome therapeutic index was higher than that of any other arsenical. Spirochetes were shown to disappear from surface lesions in less than 24 hours after use. In over 100,000 injections there were no deaths nor nitritoid reactions. There was but one Herxheimer reported, which probably favored the therapeutic index.

We have treated 34 patients having both syphilis and tuberculosis with this arsenical. The drug was given in most instances by the block method, alternating 10 or 12 injections of it with 16 injections of bismuth salicylate in oil. The arsenical was given intravenously in doses of 0.06 gram each at weekly intervals. There were no deaths or reactions from the use of the drug, a little transient nausea being the only symptom elicited in a few cases. As a rule, from 6 to 12 months' treatment was necessary before any reduction in the serum reaction was noted. However, a number of the patients left the hospital before a satisfactory trial of the drug was completed.

In the group studied there were 23 males and 11 females; 10 were white and 3 Mexican, while 21 were negro. All except 9 had far advanced tuberculosis, many of whom were hopelessly involved, not having sufficient normal pulmonary tissue remaining to carry on. The period of study ranged from 2½ months to 28 months. In all the cases studied, we have based improvement or arrest on the basis of roentgenographic, laboratory and clinical data. Of the group, 7 became well (quiescence to arrest), and 12 were improved. Of these 19, all but 2 had definite improvement in the serologic reaction and 10 had collapse therapy in one form or another. Among the 6 patients who were unimproved and the 9 who died, no collapse therapy was applicable, and none showed any improvement in serum reaction with meta-amino parahydroxyphenyl arsine oxide.

To what extent this drug contributed to the welfare of these patients cannot be definitely shown here. Padgett and Moore<sup>2</sup> analyzed a large series of cases reported by Giese and McGovern, Gallant and Sullivan and noted that without treatment of syphilis only 22 per cent of patients were improved in the status of their tuberculosis, while 47 per cent of treated cases were improved. In the National Tuberculosis

\*Received for publication August 16, 1938.

†Used as "mapharsen," Parke, Davis & Company.



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Association's five-year study of tuberculosis in negroes, it was pointed out that 21.0 per cent of negro sanatorium patients had syphilis as compared to only 4.1 per cent in white patients.

Chadwick<sup>1</sup> maintains that although syphilis does not predispose to tuberculosis, its presence materially lessens a patient's chances for recovery from tuberculosis. This has been our conten-

## RESULTS

Pt.	Age	Sex	Race	Tuberculosis on Admission	Initial Serum Test†	Total Arsenical, Gm.	Length of Study	Last Serum Test‡	Tuberculosis on Dismissal
WEM	58	M	W	Far advanced, fibroid	2+2+2+	1.50	12 mo.	2+2+2+	Stationary
*RD	77	M	W	Far advanced, hopeless	4+4+4+	.33	7 mo.	2+3+3+	Died
JC	40	M	Mex	Far advanced, moribund	0-2+2+	.62	4 mo.	0-2+2+	Died
†ABC	40	M	W	Far advanced, hopeless	4+4+4+ (fever therapy)	1.44	12 mo.	Sp. 4+	Died
AW	51	M	W	Moderate adv., fibroid	0-2+2+	1.20	13 mo.	1+3+3+	Stationary
JA	13	M	W	Arrested (hilar) childhood	2+1+1+	.72	6 mo.	0-0-0-	Well
ROF	26	M	W	Moderate, cavity	2+2+2+	1.62	21 mo.	0-0-0- Sp. neg.	Improved; thoracoplasty
OG	38	M	W	Far advanced, cavity	0-0-0- Sp. 3+3+3+	1.08	12 mo.	0-0-0- Sp. neg.	Well; pneumothorax
AP	58	M	W	Far advanced, hopeless	3+3+3+	.78	9 mo.	0-3+3+	Died
AC	30	M	Mex	Moderate, fibroid	4+4+4+	.78	7 mo.	3+3+3+	Improved; pneumothorax
EG	14	F	Mex	Active hilar, childhood	4+4+4+	.72	7 mo.	4+4+4+	Well
EMS	25	F	W	Far advanced, exudative	3+3+3+	.78	8 mo.	0-1+1+	Improved; pneumothorax
MCG	22	F	W	Incipient	4+4+4+	.72	7 mo.	0-0-0- Sp. neg.	Well; pneumothorax
ME	15	F	C	Incipient	3+3+3+	3.48	28 mo.	0-3+1+	Stationary
MS	25	F	C	Far advanced, hopeless	4+4+4+	.78	7 mo.	?	Died
JD	43	M	C	Far advanced, cavity	4+4+4+	1.44	10 mo.	3+3+3+	Improved
JC	28	M	C	Far advanced	3+3+3+	1.50	10 mo.	0-0-0-	Well; thoracoplasty
WL	50	M	C	Far advanced, hopeless	4+4+4+	1.62	9 mo.	4+4+4+	Died
OW	28	M	C	Far advanced, moribund	3+3+3+	.48	4 mo.	?	Died
HW	21	F	C	Far advanced	3+3+3+	.84	8 mo.	0-3+3+	Slight improvement
NR	24	F	C	Far advanced	4+4+4+	.84	8 mo.	0-0-1+	Improved; pneumothorax
QUC	26	F	C	Far advanced	4+4+4+	.48	4 mo.	1+1+2+	Slight improvement
MT	27	F	C	Far advanced, fibroid	4+4+4+	.18	2½ mo.	?	Stationary
FC	35	M	C	Far advanced, exudative	3+3+3+	1.86	15 mo.	0-1+1+	Improved; phrenic
AK	20	M	C	Far advanced empyema--mixed	4+4+4+	1.86	15 mo.	0-0-0-	Well; thoracoplasty
IM	35	M	C	Far advanced, hopeless	4+4+4+	1.24	10 mo.	3+3+4+	Died
RG	11	M	C	Active hilar, childhood	4+4+4+	1.86	15 mo.	0-2+2+	Well
DW	20	M	C	Far advanced; TB pneumonia	4+4+4+	0.62	5 mo.	4+4+4+	Died
LDJ	58	F	C	Far advanced; cavity	3+3+3+	0.62	5 mo.	2+2+2+	Improved; phrenic
LD	26	M	C	Far advanced, hopeless	4+4+4+	1.24	10 mo.	4+4+4+	Stationary
LD	40	M	C	Far advanced, exudative	0+2+2+	0.62	5 mo.	0-0-0-	Improved
JJ	39	M	C	Far advanced, exudative	4+4+4+	0.62	5 mo.	3+3+3+	Improved
CJ	18	M	C	Moderate, exudative	4+4+4+	0.62	5 mo.	4+4+4+	Improved

\*Paresis

†Tubes dorsalis with cord bladder.

‡Serologic tests performed by Kolmer, Kahn, Lewis (in order listed).

Sp. = spinal fluid.

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tion. We know that few of our patients became well whose syphilis was not controlled. In the same light we can say that a number of patients did not improve without collapse therapy either from a standpoint of serum reaction or pulmonary condition. The best outlook for patients with both syphilis and tuberculosis is apparently the control of their serum reaction plus collapse therapy.

### CONCLUSIONS

(1) A series of 34 patients was treated with meta-amino parahydroxyphenyl oxide for syphilis in tuberculosis.

(2) Of the number treated, 7 are well, 12 are improved, 6 are unimproved and 9 are dead.

(3) Of the patients who are well or improved, 10 were aided by collapse therapy.

(4) There were no reactions or deaths from the administration of the arsenical, nor did we feel that it lighted or reactivated tuberculosis in a single instance.

(5) We advocate the control of syphilis and collapse therapy in the patient who has syphilis and tuberculosis at the same time.

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# Esophagopleural Fistula

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## ESOPHAGOPLEURAL FISTULA

### REPORT OF CASE

By JOHN ROBERTS PHILLIPS, M.D., *Houston, Texas*

A fistula between the esophagus and pleura is relatively an uncommon condition. Davidson and Mills (2) reviewed the literature and reported two cases of esophageal respiratory fistula, subsequent to carcinoma of the esophagus, in 1924. Kanter and Madoff (1) recently reviewed the literature, and added a case in association with a chronic tuberculous empyema. The case that I wish to report has a fistula between the esophagus and pleura which

perceived some difficulty in swallowing, lost a good deal of weight, and after some time developed an esophagopleural fistula. At first, most of his food would run from his esophagus through his pleural sac, making its exit through the opening which was draining his empyema cavity. The escape of food through this opening was so great that he lost a good deal of weight, and in order to improve his nutrition he was fed through a nasal tube for a period of months. When the tube was withdrawn, he found that he could swallow solid food, but if he took liquids a great deal of it was lost externally. He has worn a tube in his right pleural cavity for about five years. He irrigates the food particles and purulent materials



Fig. 1.

Fig. 1. Fistula between the esophagus and chronic empyema cavity is shown on the right side.



Fig. 2.

Fig. 2. Following a lipiodol injection the left bronchial tree is well visualized. There is very little lipiodol in the collapsed right lung, and none appeared in the empyema cavity.

developed three years after a mixed empyema had been drained anteriorly. This fistula has been present for five years.

A white male, 59 years of age, had a diagnosis of right pulmonary tuberculosis in 1927; pneumothorax was instituted. In 1930, empyema developed which was drained anteriorly. There has been constant purulent draining from this opening since that time. In 1933, he ex-

perienced some difficulty in swallowing, lost a good deal of weight, and after some time developed an esophagopleural fistula. At first, most of his food would run from his esophagus through his pleural sac, making its exit through the opening which was draining his empyema cavity. The escape of food through this opening was so great that he lost a good deal of weight, and in order to improve his nutrition he was fed through a nasal tube for a period of months. When the tube was withdrawn, he found that he could swallow solid food, but if he took liquids a great deal of it was lost externally. He has worn a tube in his right pleural cavity for about five years. He irrigates the food particles and purulent materials



lapsed. Barium examination of the esophagus and lipiodol injection in the trachea reveal no communication between the trachea and esophagus. There is a fairly large opening in the esophagus opposite the third dorsal vertebra. I have advised that thoracoscopy be done, and if the fistula can be visualized that an effort be made to cauterize the opening in the pleura. After this, the chronic empyema should be treated by collapse of the chest wall. Due to his age and the fact that he is getting around fairly well in his present condition, he has elected not to have any surgical procedure carried out.

At the 1938 meeting of the American Association for Thoracic Surgery, Wangenstein (3) referred to a case in which the same condition

existed. His case was cured following thoracoplasty. A preliminary gastrotomy was necessary for feeding to improve nutrition.

This case is one of esophagopleural fistula in association with pyopneumothorax, undoubtedly tuberculous in origin.

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## The Present-Day Indications and Results of Phrenicectomy in Pulmonary Tuberculosis



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# The Present-Day Indications and Results of Phrenicectomy in Pulmonary Tuberculosis

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SINCE interruption of the phrenic nerve was first introduced by Stuertz in 1911 in the treatment of pulmonary tuberculosis, it has undergone considerable criticism due to a vast number of unsatisfactory results. Many clinicians limit its use to early forms of the disease while others employ it universally in all cases where pneumothorax has been faulty. Such lack of uniformity in selection of cases is bound to produce a variety of results, some of which, unhappily enough, are fatal. This feeling of uncertainty is fast leading to a disregard of the procedure, and it is with this in mind that we have undertaken this study. We believe there remains a definite place for the operation in the treatment of pulmonary tuberculosis and good results may be consistently expected.

There has been a vast amount of clinical evidence in favor of phrenicectomy in chronic pulmonary disorders. H. Wilson showed it to be definitely valuable in allaying cough and expectoration, while others have added improvement noted in fever, vomiting, hemoptysis, and hiccup. It has, unfortunately, been found to produce positive sputum in 3 per cent of patients who never were positive before the operation. This may be explained on the basis of Head's findings, in that the presence of cardiophrenic and costophrenic adhesions often augments respiratory movement after the operation.

Experimentally, it is known that the normal lung only works at about 5 to 10 per cent of full capacity, and that phrenic interruption does not reduce oxygen consumption. Werner found that it did reduce vital capacity and tidal air from 15 to 20 per cent.

with corresponding decreases in pulse rate and respiratory rate of 10 per cent, lung blood volume 25 per cent and pulse blood volume 15 per cent. This reduction of vital and tidal air has governed our selection of cases to a large extent, as will be pointed out later.

In evaluating results from the operation, one may analyze cases from many standpoints. In Graham's series of 54 cases where phrenic interruption was the sole treatment, 9 per cent became well, 49 per cent were improved, 16 per cent were unimproved and 18 per cent died as a result of the disease. Nehil and Alexander reported 113 cases without cavitation, with 86 per cent arrested or improved, and 159 cases having cavitation, with only 56 per cent arrested or improved. Again, Decker in analyzing his series of 94 cases, used the extent of involvement as a criterion for evaluating results: where there was only one-third lung involvement, 39 per cent became well; where there was two-thirds involvement, 15 per cent became well; while in cases with total lung involvement, only 5 per cent became well. This, we believe, to be paramount in the selection of cases for the operation.

The technic itself has been well standardized. We shall only remark here that temporary procedures may be induced by either alcohol injection or by crushing, but one must be sure, as Alexander has shown, to section the accessory phrenic nerve to get optimum results. The operation itself is not without hazard. Berry, in an analysis of 4697 cases from the literature, found 1.2 per cent complications and 0.5 per cent mortality directly from the procedure. These complica-



tions were computed from 26 cases exhibiting either pulmonary edema, spontaneous pneumothorax, pulmonary embolism, cardiovascular collapse, contralateral spread of disease, or hemorrhage from the avulsion. The vessels most frequently torn were the thyrocervical, pericardiacophrenic, esophageal, and subclavian. Some patients develop rather severe gastrointestinal symptoms particularly after section of the left nerve, due, as some have postulated, to a change of one of three factors: a larger stomach bubble is produced, there is a change in the path of the esophagus, or there is a change of point of entrance of the latter into the stomach.

On the basis of the foregoing clinical and experimental evidence, we have performed 100 phrenicectomies in patients with pulmonary tuberculosis, classifying them in one of the following six groups or indications:

1. Lesions comprising more than 15 to 20 per cent lung volume in which pneumothorax has been impossible.
2. Lesions comprising less than 15 to 20 per cent lung volume in which pneumothorax was inadvisable.
3. Sudden massive hemorrhage wherein rest and pneumothorax have failed.
4. Complimental to pneumothorax, where additional collapse is needed, and where intrapleural pneumonolysis cannot be performed.
5. Preparatory to some form of major surgical collapse to improve the condition of both patient and lung.
6. As a temporary measure when re-expanding a pneumothorax to give the patient additional temporary collapse, and permanently in patients who are apt to go astray.

#### A. Table of Results

	Cases		Cases
Male	45	Right side	54
Female	55	Left side	46
Temporary procedure	78	White patients	67
		Colored patients	28
Permanent procedure	22	Mexican patients	5

In this series of 100 phrenicectomies, 45 were male and 55 female; 67 were white, 28

colored and 5 Mexican. The right side was operated on 54 times and the left, 46 times; 78 of these were temporary interruptions and 22 were permanent. In studying the cases from the standpoint of indications mentioned previously, it will be noted that the poorest results were found in Group I where the patients had rather extensive involvement and no other form of collapse was employed. In this group only 54 per cent were well or improved while 46 per cent were unimproved or

#### B. Table of Results

Group or Indication	Well	Improved	Un-improved	Dead
I (50 cases)	5 (10%)	22 (44%)	6 (12%)	17 (34%)
II (12 cases)	8 (67%)	4 (33%)	0	0
III (6 cases)	2 (33%)	3 (50%)	0	1 (17%)
IV (13 cases)	7 (53%)	4 (30%)	1 (8%)	1 (8%)
V (13 cases)	11 (84%)	2 (16%)	0	0
VI (6 cases)	5 (84%)	1 (16%)	0	0

dead. In comparison, those patients who were followed up with major collapse, as in Group V, showed either arrest or improvement in every instance. Moreover, where phrenicectomy was used in limited lesions, or in conjunction with pneumothorax, the results were likewise quite satisfactory as can be noted in Table B, Groups II, IV, and VI, where arrests or improvement varied from 83 per cent to 100 per cent. When phrenic interruption was employed for massive hemorrhage, the results were strikingly good in spite of the relative amount of involvement: 83 per cent became either well or improved.

Those who have had vast experience in the use of phrenic interruption will concur with us in that the best results are obtained in exudative types of disease, particularly if not extensive; small cavitation near the hilus or lower lobe is also influenced by its use. It is of no value whatsoever in upper lobe cavities where the pleura is adherent, for inasmuch as cavity closures here have been reported, the apposition of the walls of such a cavity is too insecure and the patient returns sooner or later with reactivation. We do not feel that there is a place for bilateral phrenicectomy, but it may be used in conjunction with other forms of collapse that can be controlled, viz. phrenic on one side, pneumothorax or oleothorax on the other. Permanent phrenic interruption is not advisable in extensive or even moderately ad-



vanced bilateral tuberculosis. What was once the worst side may later be the better of the two lungs, and the phthisiologist is limited in the treatment of a contralateral involvement.

### Conclusions

There exists no indication for phrenic interruption that does not exist for pneumothorax, except in exudative lesions occupying less than 20 per cent of the lung; nor should it be any more permanent than pneumothorax. We have performed 100 phrenicectomies with the intention of showing that good results could be obtained, if certain maxims were adhered to in the selection of patients. In this study, between 83 and 100 per cent of the patients were either well or

improved, if the operation was not expected to control too much involvement.

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# TOTAL THYROIDECTOMY IN THE TREAT- MENT OF ANGINA PECTORIS

LATE RESULTS IN FOURTEEN CASES<sup>1</sup>

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# TOTAL THYROIDECTOMY IN THE TREATMENT OF ANGINA PECTORIS

## LATE RESULTS IN FOURTEEN CASES

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A GREAT number of total thyroidectomies have been done for patients suffering from angina pectoris or congestive heart failure since the introduction of this plan by Blumgart, Levine and Berlin. Sufficient time has now elapsed for the immediate results to be recorded. The primary problem is really a medical one, for only by careful study and selection of cases can the best ultimate results be obtained. We wish to add to the literature a report of our experiences with fourteen total thyroidectomies which were done for angina pectoris.

Each patient in the series had been given every advantage of medical management and had reached the state of invalidism. Each patient was carefully watched and studied so that not only the physical condition but also the cardiac and renal status was known. All had renal functions within normal limits. There was evidence of coronary sclerosis in all the cases and in one there was evidence of two small healed infarcts. The presence of a healed infarct has not been considered a contra-indication to surgery.

The basal metabolic reading is very important, since it is not advisable to recommend total ablation if the rate is below minus fifteen. In this series the metabolic readings were all within normal limits. The anginal syndrome may be improved by elevating the metabolism in some of the cases with a low basal rate and a low blood pressure. The mechanism is an improvement in the coronary circulation.

We believe that the lessening of adrenal effect is responsible for the dramatic

relief of pain in the angina pectoris cases, and a separate explanation of the results obtained in decompensated hearts must rest in the lowered metabolic demand, a limit which the damaged heart can supply. The lowering of the basal metabolic level is not an immediate phenomenon, but occurs about four to six weeks after the total ablation has been done.

The patients have been prepared by being placed in the hospital for two or three days previous to operation in order that they may become adapted to the surroundings. A sedative is given the night before and the morning of the operation. The surgery has been done by one of us (J. R. P.). The operations have been performed under local anesthetic supplemented by a little ethylene gas; in two cases the operation was done entirely under local anesthesia. The operation is not difficult and can be done in forty-five minutes to one hour. Every particle of the gland must be removed; otherwise there will be a regeneration of the remaining part and the temporary benefit will be lost. In addition, the recurrent laryngeal nerves must not be injured. However, the anatomic relation of these nerves has been so well worked out that this danger is minimal. There has been no cord paralysis in this series. The parathyroids, as a usual thing, are not greatly endangered; at least one has been demonstrated in every case. There was a transient parathyroid tetany in one case, which was easily controlled by calcium, cod liver oil and parathormone.

All the patients were operated on more than eighteen months ago, the first one



on April 12, 1934. There were nine men and five women in the series, their ages varying between 40 and 70 years.

These patients stand total removal very well, the general operative risk being between 5 and 10 per cent. There were two operative deaths in the series. The first occurred in a man, aged 70, who had a marked coronary sclerosis and had had two previous attacks of occlusion. His death was due to an acute occlusion, as shown at post-mortem examination. The second was in a man, aged 56, whose death was the result of a cerebral embolus from aortic arteriosclerotic ulcerations.

There have been seven excellent results and two cases with good results. Five patients are living over two years after operation. One individual had excellent results for one year, but has had two attacks of coronary occlusion since that time. Another died six weeks after operation of coronary occlusion. Still another died seventeen months after operation of coronary occlusion, though he had had fair results before his death.

Since surgical myxedema does not begin to manifest itself until four to six weeks after the whole thyroid is removed, there is no need for thyroid extract until that time. These patients take one tenth grain of active thyroid substance two or three times each day, which overcomes the greater portion, but not all the myxedema. One patient, although with a well marked myxedema, has had no distressing symptoms and consequently takes no thyroid extract.

Two patients have had very interesting experiences following total thyroidectomy. The first, a man who two years ago had a total removal for severe angina, about six weeks ago presented himself with a ruptured gangrenous appendix. He was operated on for this and had a very easy postoperative convalescence. The second, a woman who twenty-one months ago had a total removal for congestive failure with angina, has since conceived and carried

the pregnancy to term without decomposition or pain. Her baby is now five months old and is perfectly normal.

Name	Age	Occupation	Date of Operation	Result
M. L. R. ....	44	Clothier	4-12-34	Excellent.
H. C. H. ....	46	Merchant	5-26-34	Good.
L. T. P. ....	49	Contractor	5-28-34	Good—died 12-10-35, coronary occlusion, 17 months after operation.
A. M. ....	51	Merchant	6-2-34	Excellent.
J. K. ....	70	Ranchman	6-25-34	Died immediately after operation, coronary occlusion.
W. H. ....	50	Theater	8-17-34	Excellent.
Mrs. C. A. P.	40	Housewife	10-9-34	Fair—excellent for one year, two attacks since.
N. T. ....	50	Farmer	1-21-35	Relief for six weeks, death due to coronary occlusion.
Mrs. L. H. ....	48	Housewife	8-19-35	Good.
Mrs. M. B. ....	35	Housewife	9-30-35	Excellent.
Mrs. B. E. G.	25	Housewife	9-30-35	Excellent.
Mrs. E. F. ....	50	Housewife	10-15-35	Excellent.
J. C. N. ....	45	Plumber	10-23-35	Excellent.
E. K. N. ....	56	Ranchman	2-5-36	Died, cerebral embolus.

Not one in our series feels that he or she is cured. All of them live well within their pain range, yet each one is better and would gladly repeat the measure if necessary. They are all rehabilitated cardiac invalids. The present level of improved status fully justifies the use of total ablation of the thyroid gland in properly selected cases of angina pectoris.

#### SUMMARY

A series of fourteen patients, who had had total thyroidectomies at least two years previously, is reported. All of these patients were suffering from angina pectoris of the most severe form. All showed some degree of coronary sclerosis and several presented definite evidence of cardiac infarction.

We feel, from the evidence presented, that while none of these patients may be considered cured, the present level of improved status fully justifies the use of total ablation of the thyroid gland in properly selected cases of angina pectoris.

# Collapse Therapy in Pulmonary Tuberculosis

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## Collapse Therapy in Pulmonary Tuberculosis\*

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We should like to present to you some interesting facts regarding surgical collapse in pulmonary tuberculosis. The progress during the last few years in this very fascinating type of surgery has been so tremendous as to elevate it to the plane of other less radical operative procedures. Most thoracic surgeons take pride in its development, but also feel a sense of regret in every case they present. It is because each radical operation for tuberculosis denotes a pitfall in previous diagnosis and possibly treatment—for there is a stage in every case where a less radical approach would have effected a cure. It simply means that the more we learn about radical pulmonary collapse, the fewer cases should come to our attention if our methods of prevention and early diagnosis are expediently exercised. Nevertheless, many of us have a feeling that there will always be a place for this type of work as long as certain economic standards exist, which account to a large extent for many of our far advanced cases. This will occur despite the steady reduction in mortality figures thus far produced by an efficient public health program.

The underlying principle in healing any tuberculosis, let alone any infectious disease, is rest and fibrosis. In tuberculosis, this means rest and collapse; and due to the nature of granulation tissue it must necessarily extend over a longer period of time than the more simple infections. The rest, therefore, implies both general and local rest as proposed by Trudeau, and the fibrosis implies a certain factor of personal resistance producing healthy cicatrization and pulmonary contraction. Rest itself is insufficient in healing many cases, especially those complicated by cavitation, and as long as there is cavitation there can be no cure. A cavity always remains as a potential source of spread to other areas of the lung, eventually producing more cavitation and eventual reduction of vital capacity, to say nothing of the absorption of tuberculo-toxin with an essential generalized disseminated tuberculosis. It is for this cavernous pathological pulmonary remnant that surgical collapse is mainly devised.

Each surgeon in the field has an individual set of maxims that he believes are para-

mount, but the following are generally accepted:

1. Full cooperation must be afforded between the surgeon and internist in the choice of patients for surgical collapse.
2. Surgery does not supplant rest in the treatment of pulmonary tuberculosis, nor should operation be delayed for the sake of an additional worthless period of rest. There is always a precise time for surgery.
3. Never operate exudative tuberculosis. It will only glorify your mortality figures.
4. Be sure of cardio-renal reserve in patients over 45. Age itself is no direct contra-indication.
5. One must be sure that there is sufficient vital capacity furnished by the remaining lung tissue to afford the individual with a working pulmonary reserve.

The type of operation to be employed is important; it must essentially be temporary or permanent. Temporizing procedures are used on any lung that we think can be rehabilitated for any use whatsoever. Artificial pneumothorax is the simplest method by far and probably the most universally applicable. Whenever the disease has existed two or more years, we can expect to encounter difficulty in introducing the air due to adhesion formation between lung and chest wall. These adhesions nearly always occupy a critical location in relation to the disease process and may prevent any effective collapse. While pneumothorax is not usually considered a surgical method of collapse, still the abolition of adhesions is. There are two methods for effecting this: closed and open pneumolysis. Stretching adhesions by producing positive intrapleural pressures is not only usually ineffective, but hazardous due to the possibility of tearing the lung and consequent empyema.

Closed pneumolysis by means of a direct vision thoracoscope affords the safest means of cutting adhesions. Peters found that 39% of pneumothorax cases were ineffective, and that 78% of these could be converted to a complete collapse. The procedure is relatively safe since the introduction of Matson's electrocoagulation method, the risk of operation being little greater than 1% in carefully selected cases. The greatest danger lies in its application in cases of bilateral pneumothorax, where cavity rupture or spontaneous col-

\*Read before the Jasper-Newton County Medical Society, February, 1938.



lapse are morbid complications. However, in most these instances its use is justified where it portends the individual's only hope for cavity closure. Open pneumolysis, although practiced by a few thoracic surgeons, is still a hazardous operation. Deliberate entrance to the pleural cavity by incision and severance of adhesions by actual cautery is too frequently followed by tuberculous empyema.

Following artificial pneumothorax, pleural effusion not infrequently follows. This does not concern us unless it becomes uncontrollable from the standpoint of pressure or toxic symptoms. Frequently there is a gradual transformation of serous exudate into empyema. These are ideal cases to convert to oleothorax by replacing the air with some such sterile oil as pomenol, paraffin oil, olive oil, or cottonseed oil.

The diaphragm controls approximately 30% of our respiratory excursion, and interruption of the phrenic nerve will allow the diaphragm to rise and effect a collapse depending on the extent of costophrenic and pericardiacophrenic adhesions. This operation as introduced by Stuertz in 1911 was originally a permanent procedure, but lately, Alexander has pointed out the many advantages of a temporary phrenic paralysis. This was proposed to conserve any possibly normal pulmonary tissue for future use in the ipsilateral lung. We most always do the temporary operation first, and later convert it to a permanent collapse if the remaining air space is nil. Needless to say, it is embarrassing to have a contralateral infection develop with no other resource, after having performed the permanent operation on what now is the patient's better lung. At its best, phrenic interruption will cure only 9% of the cases where it is employed, but probably is the best method for closing centrally-located moderate-sized cavities. It will frequently clear up an exudative lesion in preparation for a more radical operation.

Another temporizing procedure of note lies in severing or crushing the intercostal nerves. Intercostal neurectomy has not been utilized extensively in this country by any but Alexander, who has reported some 20 cases with fairly good results. We have employed it in two hopeless cases with gratifying results. Its greatest merit lies in the absolute state of rest in the lung when combined with phrenicectomy preparing patients as better candidates for more radical surgery. The period of paralysis after crushing the nerves extends approximately six months as in temporary phrenicotomy, during which time considerable healing can be demonstrated in the operated side.

Thoracoplasty is the most effective operative procedure we know for closing pulmon-

ary cavities. It was first introduced by de Cernville in 1885 and popularized by Sauerbruch, who resected posteriorly short segments of all the ribs from the 1st to the 11th, inclusive, in one or two stages. Brauer and Friedrich realized the shortcomings of this operation in closing large cavities and proposed resection of longer rib lengths. Their mortality was necessarily higher, due to the fact that in either method, the second stage had to follow the first in a few days if the operator did not want to be confronted with re-resecting the regenerated ribs from the first stage. Wilms proposed a happy medium of both operations, taking rib lengths that were the average of his predecessors' and limiting the collapse to as many ribs as were necessary to close the cavity, usually seven or eight. This we now term as selective collapse. The present-day methods are an outgrowth of the work of these pioneers and others, as Eastlander, Schede, Simon, Quincke, Spengler, and Gourdet. We usually remove all the first and second ribs during the first stage, and due respect must be paid to certain structures overlying the first rib as the brachial plexus and the subclavian vessels. We also resect posterior rib stumps, and corresponding transverse processes; this allows the apex of the lung to descend. The length of the succeeding ribs and the number removed is governed by the size of the cavity. Usually resection extends from the anterior axillary line to the transverse processes posteriorly. The rib beds are painted with 10% formalin to delay regeneration of the ribs, and roentgenograms are taken previous to each succeeding stage to determine the amount of collapse affected and if there is an exudative flare-up. Thus, a patient is as good a risk for subsequent stages as for the first. The most popular selective collapse employs a seven-rib resection, insomuch as it incorporates the usual amount of pulmonary tissue overlying the average-sized cavity. Frank Dolley has done a number of four, five and six-rib operations with success, resecting as many ribs as necessary to close the cavity. When doing a six-rib collapse it is necessary to resect the tip of the scapula to insure freedom of motion of the shoulder girdle. The mortality with the present-day methods varies from 4 to 21% under such men as Eloesser, Hedblom, Archibald, Head, Coryllos, Sauerbruch, Bull, O'Brien, Alexander, Denk and others. In any case complicated by empyema, the mortality is, of course, higher, and more extensive resections are essential, comprising 11 ribs. Alexander states that we may now guarantee 94% cavity closure with these methods. We say closure, and not just cavity wall approximation.



There are few branches of surgery in which the pre- and post-operative care deserves more vigilance. The usual run of post-operative complications are not trivial; pulmonary embolism, tuberculous pneumonia, and pulmonary-spread all top the list. Therapeutic oxygen is employed at the slightest indication of complication. Anesthesia is quite a delicate problem, preference having been shown for nitrous oxide, ethylene or cyclopropane in combination with novocaine locally. Intra-tracheal methods are still at the point of conjecture, and where an electro-coagulation unit is used, it is imperative to select a non-inflammable agent. We always put our patients on postural drainage before and after operation to insure absolute removal of cavity secretions. Patients are always placed in bed in the operating room to save them from any exposure. Morphine must be given cautiously to prevent cyanosis, and atropine is contra-indicated in that it makes the bronchial secretions too viscid to expectorate.

I will merely mention a modification of this type of surgical collapse in extra-pleural pneumolysis. This operation will produce a limited collapse of the apex of the lung by placing a pack between the upper ribs and endothoracic fascia. There is little shock to the procedure as it is rarely necessary to resect more than a portion of one rib. Paraffin of a specific melting point is the material of choice, but fat, muscle, gauze, and inflatable rubber bags have all been used with varying degrees of success. The disadvan-

tages lie in the limitations of its use to only moderate-sized cavities, and the frequency of secondary infection necessitating removal of the pack. This method is frequently used in bilateral surgical collapse when a thoracoplasty has been performed previously on the opposite side.

To recapitulate, cavity closure in pulmonary tuberculosis may be effected by a number of surgical means. Temporary operations are to be encouraged whenever there is any hope of salvaging pulmonary tissue for future use. The present-day status of thoracoplasty is such that it need no longer carry its dreadful mortality. This has been accomplished mainly by a proper selection of cases, certain technical advances in the operation itself, and careful pre- and post-operative management. Moreover, the more radical operations should be reserved for the far advanced patient, and then propitiously avoiding exudative phases.

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## A CASE OF HYPERPARATHYROIDISM ASSOCIATED WITH EXTREME DENTAL CARIES

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**H**YPERPARATHYROIDISM is a rare disease. Wilder and Howell accepted as proved only 135 cases reported in the literature from 1925, the time of Mandl's description of the condition, up to June, 1935.

The diagnosis is relatively easily made provided the condition is suspected and proper laboratory procedures are carried out, namely x-ray examination of the bones, and determination of the serum calcium, phosphorus, and phosphatase. However, because the symptoms of the disease are protean and many of them not distinctive, it often goes undiagnosed. The frequently encountered lethargy, atonia, and polyuria can hardly be counted on to direct attention to the possible presence of hyperparathyroidism, but when there is a history of fractures from slight trauma, or the presence of bone pain, bone tumors, or renal lithiasis, one should always investigate for this condition.

The following case is reported because the presenting symptom, namely dental caries, had not to our knowledge been encountered previously in the recorded cases of hyperparathyroidism.

The patient was a married woman, aged 33 years, complaining of widespread dental caries. The history showed there had been a certain amount of bone pain present since childhood, especially involving the right hip and the pelvic girdle. During each of three pregnancies, nine, eleven and thirteen years before, there had been increased pain in the pelvic bones and trouble with the right hip. There had also been pain in back and shoulders. Eleven years before, while pregnant, she had probably fractured a rib by lifting her 2 year old baby and more recently she had had a possible fracture of the eleventh rib on the left following a slight trauma.

There was a profound sense of fatigue and inability to get enough sleep. The patient

stated that she could sleep fourteen to sixteen hours a day. Her appetite was exceptionally good. At times she complained of burning pain in her abdomen when hungry. There was no constipation. She showed increased susceptibility to colds and bronchitis. The menses had been quite normal.

For years, on the advice of her dentist, she had been in the habit of drinking milk, and taking calcium and cod liver oil.

The family history disclosed that there were twelve cases of carcinoma of various organs of the body in the paternal line, while in the maternal line there were many cases of tuberculosis, but there was no record of any bone disease.

On examination the temperature was 98.6°F. The blood pressure was 116/82. The most striking finding was the extreme caries involving every tooth, many of which were riddled with multiple cavities. The tonsils were large, cryptic, and contained fluid pus. The breasts were small, the left showing an inverted nipple and the right a tender nodule. The left eleventh and twelfth ribs were sensitive to pressure and there were tender points along the crests of both ilia. The reflexes seemed about normal and there was no evidence of hypotonia.

The hemoglobin was 90 per cent. The urinalysis was negative. The serum calcium was 15.0 mg. per cent, the inorganic phosphorus 2.5 mg. per cent. Roentgen ray examination of the chest, ribs, cranium and pelvis showed no evidence of osteitis fibrosa cystica, but there was moderate osteoporosis especially involving the ischial rami and the bones of the skull were definitely thickened. A diagnosis of hyperparathyroidism was made and operation advised.

At operation only one parathyroid gland could be demonstrated on each side, although an extensive dissection was carried out extending down into the mediastinum from which a small piece of the thymus was removed. Both of the parathyroid glands appeared only slightly enlarged. The one on the left was removed; the one on the right was preserved. At the same time a subtotal thyroidectomy



was also done, removing about five-sixth of each lobe; no parathyroid tissue was found in the resected lobes.

The patient made an uneventful recovery. The serum calcium had dropped to 10.0 mg. per cent on the fourth postoperative day. Following operation all bone pain disappeared and the former lethargy was replaced by irritability, nervousness, and emotional unbalance. The deep muscle reflexes became hyperactive but no Chvostek or Trudeau phenomena appeared. Four weeks postoperatively, while these symptoms were at their height, the blood calcium was still found to be 10.0 mg. per cent and the phosphorus 2.9 mg. per cent. The hyperirritability promptly subsided on administration of cod liver oil and calcium. Whether or not the dental caries will be checked remains to be determined after the passage of time.

We believe the diagnosis of hyperparathyroidism is justified in this case even in the absence of marked typical changes in the bones because of the preoperative hypercalcemia and hypophosphatemia, the return of the serum calcium and phosphorus to normal immediately after removal of the parathyroid tissue, the replacement of lethargy and hypotonia by an abnormal irritability which was relieved by calcium administration. It seems likely

that the disease had been present for a long time without greatly injuring the skeleton because of the protective effect of the self-administered calcium and cod liver oil, for it has been shown that administration of vitamin D and calcium tends to prevent skeletal decalcification, while at the same time encouraging high serum calcium and calcinosis.

Churchill and Cope have recently reported on six cases of hyperplasia of the parathyroid glands without tumor. This case probably falls into the same category. While these tumors are often hard to find at operation and while in some cases tumors have been found only after repeated explorations, the fact that such a thorough exploration was done in this case without finding a tumor, coupled with the fact that after removal of one parathyroid gland the serum calcium and phosphorus returned to normal and all symptoms disappeared, leads us to believe that the condition was one of hyperparathyroidism due to hyperplasia of the parathyroid glands.

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# Surgical Management of Acute Appendicitis

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ANY treatise on acute appendicitis should be prefaced by the statement that it is still one of the major problems of the practitioner, pathologist, and surgeon. Probably no operation of major importance is performed more universally than appendectomy. It is well known that the mortality has apparently increased in the last twenty years despite better methods of treatment and diagnosis. Last year approximately 25,000 persons died of this malady, and we must admit that there are still many men in the field of operative surgery who are treating all cases of recognized or unrecognized appendicitis just as they did twenty years ago. Herrick believes that the responsibility for some of the increased mortality must be borne by the staff surgeons themselves for having referred many of these cases to the resident or interne for treatment. Any surgical condition which carries a mortality of 5 to 30% as appendiceal peritonitis does, certainly merits the attention of the most proficient minds in the specialty.

The mortality in any given series of cases will vary depending on the surgeon, locality, year of the report, and type of hospital. One of the best series of results was reported by Dixon of the Mayo Clinic in 1932 where the mortality for 528 cases of all classes of acute appendicitis was only 1.5%. In addition, there are many other interesting reports of McDonald, Bower, and Miller to which the reader is referred.

## AUTHOR'S CASES

The small but significant series of cases we are presenting herein represents a consecutive number of 142 patients with acute appendicitis who were subjected to operation without a single patient mortality. We hope that by emphasizing certain maxims of diagnosis and treatment, one will be able to keep his mortality within reasonable limits.

There is nothing mysterious about good results in the treatment of appendicitis. Surgeons have long classified all acute cases into three groups: 1. Unperforated appendix, 2. Perforated appendix, with local abscess formation, and 3. Perforated appendix with diffuse peritonitis. The ability of the surgeon to correctly catalogue each case into one of the three groups is the keynote of success in treatment.

The relative number of cases falling into each of these categories is variable, but the mortality of each group remains significantly constant. Holder and Wells reported a composite series of 9566 cases with a mortality of 4.8%. In the unruptured group the mortality was only 0.55%, while the mortality in the abscess group increased to 9.0%. Moreover, those with diffuse peritonitis had the astounding mortality of 30.5%. Our series are represented below, but as there is no mortality, we can only show the relative number of cases in each group.

I. Unruptured appendicitis	131
Catarrhal	93
Suppurative	26
Gangrenous	12
II. Ruptured, local abscess	6
III. Ruptured, diffuse peritonitis	5
Total	142

## UNPERFORATED APPENDIX

This includes all cases of right-sided pain which are known or suspected to be appendicitis, having tenderness and possibly localized rigidity. There is no mass, peristalsis is active and there are no signs of peritonitis. The age of the patient, history of previous attacks, history of cathartics, etc., may influence the development of peritonitis later, but the appendix in these cases is still in a catarrhal state of inflammation. Many cases of suppurative or gangrenous appendicitis may be included in this group if abscess formation has not taken place. It makes little difference whether we see this patient on the 1st or 5th day of the disease if he presents these findings. The treatment is immediate operation with removal of the appendix, and the surgeon will have practically no mortality therefrom.

## PERFORATED APPENDIX WITH LOCALIZED ABSCESS

When the acute suppurative or gangrenous appendicitis progresses, abscess formation will frequently result. This is dependent on the tissue's ability to wall off the infection; but since a perforation has occurred and a number of intestinal organisms have been liberated, abscess formation is inevitable. Again, it makes little difference whether we see this type of case on the 4th or 8th day, provided we can be assured that the process is a local one. There may be a mass to suggest the abscess; leukocytosis may be marked but this is not pathognomonic. Peristalsis gives us no helpful clue—but one thing is certain, there is no spreading peritonitis. Operation again is the treatment, and that without delay. Most of these cases require drainage even if the abscess is small; and if the perforation is seen before a large abscess develops, amputation of the appendix is in order.

## PERFORATED APPENDIX WITH SPREADING PERITONITIS

When the organisms present in the peritoneal cavity are great in number, and the individual's resistance is low, a spreading peritonitis results. If one's diagnostic ability will enable him to discern the presence of such a diffuse process with all its stigmata if Hippocratic facies, rapid pulse, diffuse tenderness, distention, absence of peristalsis, in addition to the signs of the acute appendicitis, treatment then becomes simplified. To these we administer the Ochsner-Sherren method of treatment and delay operation until the process becomes localized. It is our contention that a patient whose leukocytic response is poor in the face of a spread-



ing infection is perhaps harmed by the additional trauma of incision. Drainage instituted in one lower quadrant when the infection is in the other three cannot cope with the problem. Gamble obtained good results by incision and drainage in 129 cases (mortality 1.5%), but followed his operative treatment with intensive local heat supplied with a 40 candle-power bulb; however, his results were no better than those of Bailey or Guerry who deferred operation. Immediate operation in a comparative series as reported by Shipley or Guerry increased the mortality to 8.3 and 10.7% respectively.

Nature tries to defend the host by immobilizing the bowel, with decreased peristalsis. If the bowel is relatively empty, the distention and other hazards of ileus are minimal. It is important then to splint the abdomen by withholding food and drink, placing the patient in Fowler's position to relax musculature, using ice caps over the abdomen, the introduction of suction-siphonage as advocated by Wangensteen, and the administration of morphine. Collier emphasizes the dehydration factor in these patients and advocates giving several litres of glucose in saline intravenously in order to produce a urinary output of 1500 c.c. daily. Patients who die with such conservatism would certainly perish with the added insult of operation. Collier and Potter found that of 85 such patients, 9.4% died; and of those who recovered 37% became well spontaneously and the remaining 62% developed abscess.

To recapitulate then, we advocate the Ochsner-Sherren treatment in cases of ruptured appendix with diffuse peritonitis; and we delay surgery until the process becomes localized.

#### THE NON-OPERATIVE REGIMEN

1. Absolute rest to both patient and bowel. This is accomplished by giving nothing by mouth, instituting Fowler's position, and using plenty of morphine.

2. Combating dehydration. This is best done by administering intravenous solutions to the amount of several litres daily.

3. Combating distention. This is accomplished by the Wangensteen suction-siphonage tube in the stomach or duodenum.

In regard to the operative treatment, there are few points to emphasize since the technic of appendectomy is well standardized. Needless to say, one should exercise as little trauma as possible. Gauze packs in the abdomen only help to spread infection, and exploration is needless and harmful. The type of anesthesia, we feel, has little to do with the prognosis. Good results are obtained equally with inhalation agents, spinal, or local anesthesia depending on the preference of the surgeon. One should employ the McBurney incision wherever possible. Reid found that he could reduce his mortality 5% by adopting this one point of technic. Where the diagnosis is doubtful, the Battle incision is more useful. Whether to invert the stump or not is immaterial as far as outcome is concerned. It is probably better in the presence of an abscess to

forego inversion of the stump as a small secondary abscess in the wall of the cecum may result. Enterostomy has no place in the operation; obstruction is due to adynamic ileus and not a local kink or band. Shute performed 117 cases with cecostomy and found that it added nothing to his results. Drains should be used in suppurative cases, but the drainage material should not be placed in contact with large vessels or loops of bowel because of the danger of erosion.

Post-operative treatment has more influence on the outcome than any particular technical consideration. Patients respond better if fluids are maintained and the bowel is splinted until the operative area is well walled-off. Herniation of the incision should not result if the patient is kept in bed for a sufficient length of time. We had no herniation in the series of cases reported.

#### CONCLUSIONS

1. The diagnosis of appendicitis and the recognition of peritonitis when present is important in determining operability of an acute case.
2. Immediate operation is advocated in acute unruptured cases or in abscess cases when the process is localized.
3. In diffuse or spreading peritonitis from a perforated appendix, operation should be delayed until the process is a local one. The Ochsner-Sherren treatment is employed in the interim.
4. The surgeon should not be influenced by the age of the patient, duration of the symptoms, history of catharsis or previous attacks, amount of leucocytosis, etc. The palpating hand should determine the course of treatment in each given case.
5. A series of 142 cases is presented exemplifying these maxims, in which there was not a single patient mortality.

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# Some Unusual Tumors of the Chest

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TUMORS of the chest always manage to create considerable interest despite the many articles that concern them. In the average lung clinic, the diagnostician will see from time to time interesting varieties and pathological types of neoplasm, many of which are characteristic from their Roentgen studies alone, others which demand all the armamentarium of the bronchoscopist, clinical pathologist, radiologist, and thoracic surgeon. We should like to present herewith a few cases which have aroused our interest in the past few years, more from a diagnostic and therapeutic point of view.

Case 1: This patient, a white female, aged 57, was first seen by a physician in November, 1937 for pain in the right costal margin radiating to the back. The history dated two months previously and she was treated for cholecystitis. Pain became so unendurable that Roentgenograms of the lung were taken as a routine measure and were diagnosed as pulmonary tuberculosis (Fig. 1, p. 4). One of us was called as consultant February 2, 1938, when the diagnosis of malignancy seemed apparent. By this time the pain was mostly in the back in the interscapular region and there was a considerable area of anesthesia under the right costal margin. A mass about the size of a halved grapefruit protruded from the right posterior thoracic cage. Roentgenograms were repeated and, by this time, there was erosion of the 7th, 8th and 9th ribs posteriorly and portions of the corresponding vertebral bodies, a literal saucerization of the spine. The biopsy taken at this time showed a histopathological diagnosis of malignant mesothelioma of the pleura. Needless to say, her case was too far advanced for any form of therapy and she expired April 4, 1938.

Case 2: An Assyrian male, aged 52, was first seen by a physician for pain in the right upper chest in October, 1934. Roentgenograms made at that time showed a large mass in the upper right chest, but, unfortunately, no therapy was advised. He first consulted one of us seven months later with a loss of 10

pounds of weight and with more constant and excruciating right shoulder pain. Another Roentgenogram (Fig. 2, p. 4) showed enlargement of the mass to three times its previous size with erosion of the 2nd, 3rd and 4th ribs posteriorly on the right. Physically one could see a large mass protruding posteriorly from the thoracic cage. There was no external evidence of adenopathy. After preliminary pneumothorax to determine the attachments of the tumor, he was explored under ethylene-oxygen anesthesia June 25, 1935. Complete excision of the posterior thoracic cage with pneumonecotomy was performed within forty minutes. Two mediastinal glands were excised, which were positive for malignancy. The pulmonary hilum was uniformly necrotic but there was very little blood loss. He was transfused at once with 500 cc. whole blood. His immediate convalescence was exceedingly good, but after 30 hours he suddenly expired. A post-mortem examination through the thoracic incision revealed erosion of one of the pulmonary veins and tumor embolism to the left auricle. The pathological diagnosis was adenocarcinoma of the lung, grade III.

Considerable debate has been aroused in the past concerning the true nature of the so-called "endotheliomas" or "mesotheliomas" of the pleura. Wagner, Bostroem, Neelsen, Volkmann, and Adler have traced the tumor origin to the subpleural lymph spaces, while Benda and Gurrmann have proposed its origin from the pleura itself. Robertson, in 1924, showed that such tumors with epithelial characteristics could not arise from pleura, but that these growths probably reached the pleura from metastatic invasion or by direct extension from primary tumors of the lung. Similar types of tumor have been found by Scagliosi in the costal pleura and by Rossier and Pollmann in the dura, peritoneum, and pericardium. No form of therapy seems to be available which will control their rapid growth.

Case 3: This patient, a white male, aged 25, had first symptoms of a non-productive cough, hemoptysis, and pleural pain in the



right chest for 6 months previous to diagnosis. Physical examination showed no abnormality of the glandular system. Roentgenograms of the chest (Fig. 3, p. 4) showed three discrete masses in the right chest, all about 4 to 5 cm. in size. One was at the hilum, one at the cardiohepatic angle and the other at the costophrenic angle. He refused either bronchoscopy or biopsy so deep radiation therapy was advised with the belief that this was a lymphoblastoma. The blood studies are interesting: total white count 7000 including 26 per cent lymphocytes, 65 per cent neutrophils, 2 per cent monocytes, and 7 per cent eosinophils. After Roentgen therapy (Fig. 4, p. 4) there was complete disappearance of the tumors within 16 weeks, with the following change in the blood smear: 8 per cent lymphocytes, 70 per cent neutrophils, 12 per cent monocytes and no eosinophils. He had gained 10 pounds of weight and was asymptomatic. Our presumptive diagnosis was apparently correct. It was interesting to note that two years before, he had had a six months history of diarrhea, which may have been due to abdominal lymph gland involvement.

A rapid response to irradiation in these tumors is not a good omen. They usually recur much faster when exhibiting such radiosensitivity. Chronic forms of the disease may live as long as from 5 to 25 years, but one may safely say that these patients nearly always die of recurrence. Experimental work from some workers in the past few years might seem to indicate that Hodgkin's Disease is related to Brucellosis. There are features of this case which would support this.

Case 4: This patient, a white male, aged 47, was admitted to a tuberculosis ward with a diagnosis of pulmonary tuberculosis of the left apex from a Roentgenographic opinion (Fig. 5, p. 4). One of us was called as consultant due to the fact that no tubercle bacilli could be recovered in three examinations of the sputum. To us the Roentgenogram showed definite evidence of tumefaction of the type frequently ascribed as "sulcus" tumor. This man had erosion of one rib and marked pain in the left shoulder and arm to the extent that he had quit work five months previously. Within one month he de-

veloped a massive bloody pleural effusion, the centrifuged specimen of which revealed tumor cells, and within another month, he was dead. The pathological diagnosis from necropsy was: primary mesothelioma of the pleura, with extension into lung and mediastinal structures.

This case shows with what rapidity these tumors may invade adjacent structures. Pancoast, in 1924, described a series of similar cases which he called "superior pulmonary sulcus tumors" all of which showed erosion of the ribs, Horner's syndrome on the same side, and a classical history of pain in the shoulder with radiation down the arm. Most pathologists are of the opinion that this tumor is really another form of bronchiogenic carcinoma, but Pancoast thought its origin was from an embryonal epithelium rest. Similar cases have been reported by Evans, Steiner and Francis, Fried, Jacox, Marcil and Crawford, Davidsohn, Feldman and Danielius, and Stein. Frost and Wolpaw reported a case which resembled these in 1936, which had its origin in the inferior cervical ganglion, a true sympathoblastoma. Regardless of the nature of the histopathology, these tumors resist most forms of therapy. Early surgical removal seems to offer the only hope for cure.

Case 5: This patient, a white male, aged 47, had a five months history of pain in the left chest with cough and hemoptysis. Sputum examination had been negative for tubercle bacilli. On examination the whole left chest was dull to percussion and Roentgenograms (Fig. 6, p. 4) showed "a sharply defined orange-sized shadow, continuous with the mediastinum and lying inseparably from the posterior pleura, pushing the left lung away with the parietal pleura intact." "There was no atelectasis. The kymograph showed no pulsation. There was erosion of the 4th, 5th, and 6th ribs near their costovertebral articulation." The Kahn and Wasserman tests were negative. A biopsy was taken which showed: primary tumor of the pleura, upper posterior left chest.

The presumptive diagnosis in the previous case was bronchiogenic carcinoma of the lung, but by the time a complete diagnosis was made, the case was evidently inoperable.



In viewing any case for suspected tumor, one should ascertain with certainty whether the growth is primary or metastatic. Roentgenograms in different planes are invaluable as they may reveal the origin of the tumor as from lung or mediastinum. Any discreet or sharply defined density in the pulmonary field should make one suspicious of new growth. Other evidences of bronchial obstruction may be present without any noticeable tumor, as atelectasis or emphysema of a portion of a lung, hilar enlargement, or an area of pneumonitis. Frequently, accompanying pathology may be manifest as bronchiectasis, tuberculosis, or lung abscess. One should always determine the causative agent in any of these conditions as they may be secondary to bronchial obstruction from neoplasia. It may remain for introduction of iodized oil into the bronchial tree to actually portray the pathological agent; in any event, this should be done as a subsidiary method of diagnosis in these obscure cases.

Benign tumors of the lung, per se, are just as important clinically as malignant tumors. By the time their presence is diagnosed, the patient is having symptoms due to enlargement, as pressure symptoms with obstruction to circulation, or dyspnea from pressure on the mediastinum or large main bronchi. Moreover, their extirpation is justifiable on the score that a relatively large percentage of the so-called benign growths develop malignant change sooner or later.

As adjuncts in the diagnosis of tumors of the lung, we utilize bronchoscopy, pneumothorax, biopsy, thoracoscopy, and thoracotomy in the order named. Not only can the bronchoscopist actually visualize the tumor in many cases, but this is often an expedient method of obtaining a biopsy. Pneumothorax should be performed in order to outline the tumor from its chest wall attachments, and to determine its actual extent in the lung parenchyma. It is a simple maneuver to introduce a thoracoscope at this time to visualize the mediastinal glands and pleural surfaces. Frequently, the operability of a growth can be thus determined. In any case of doubt, the patient should have the benefit of thoracotomy, as many times one will find that the mass is entirely resectable. In this

regard, nothing short of pneumonectomy offers any hope for cure. This type of surgery is best relegated to the experienced thoracic surgeon since the mortality in untrained hands without suitable armamentarium is apt to be prohibitive.

Emphasis must be placed on the early signs of carcinoma of the lung. As mentioned before, other pathology frequent heralds its appearance in disguise. In addition, any undiagnosed cough, hemoptysis, thoracic pain or shoulder pain, or unilateral "wheezing" should arouse suspicion until carcinoma is ruled out. Many so-called asthmatics are early cases of bronchial obstruction. In most of the diagnosed tumor cases, the history unfortunately is short lived. About 25 per cent have symptoms less than three months and another 25 per cent have a history of less than six months. Contrary to many beliefs, carcinoma of the lung is not necessarily a disease of middle age; over 40 per cent are diagnosed before the age of 45, of those seen in consultation. Pathologically, there are three main types: the squamous cell variety, the adenocarcinoma, and the oat cell type. Although the last of these is probably the least rapid in developing, their pathological differentiation is not so important, as all must be removed early. Not until routine fluoroscopic or Roentgenographic examinations of the chest are made in the general physical examination are we hopeful of diagnosing these cases early. It is the early diagnosis which offers the most toward early extirpation of the growth and eventual cure.

#### *Conclusions*

1. Five cases of lung tumors are presented herein which show interesting problems of diagnosis and treatment.
2. Early diagnosis in bronchiogenic carcinomas is urgent, if cures are to be expected. The aid of the bronchoscopist, radiologist, and thoracic surgeon is indispensable in arriving at a final conclusion.
3. Benign tumors of the lung demand as thorough a diagnosis and treatment as do malignant ones, due to their propensity for malignant change.



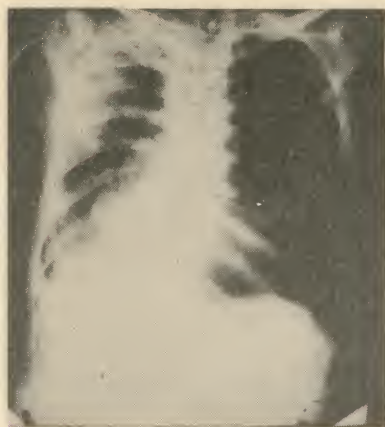


FIGURE 1

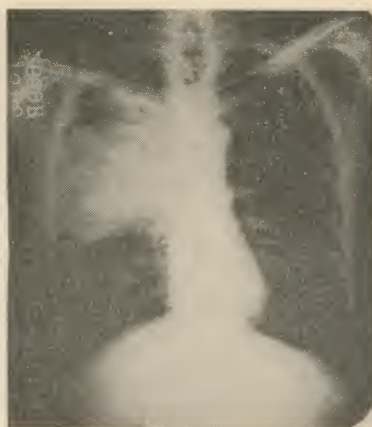


FIGURE 2



FIGURE 3

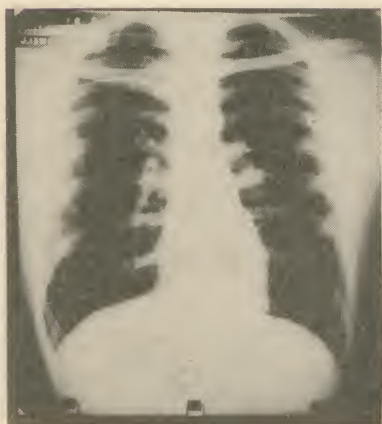


FIGURE 4

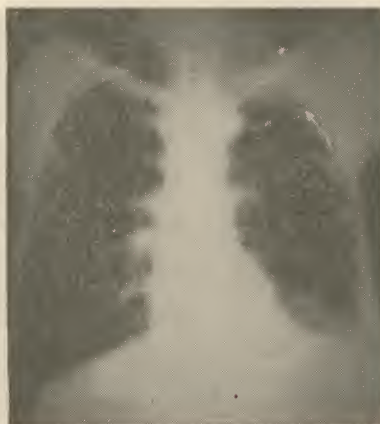


FIGURE 5

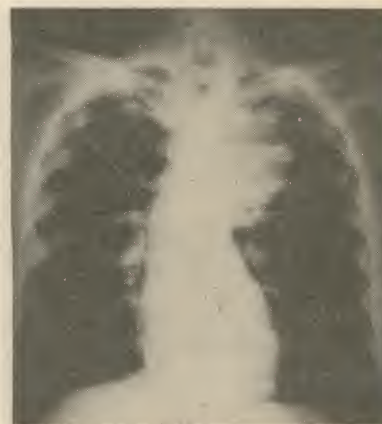


FIGURE 6

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